AMERICAN GAS ASSOCIATION MONTHLY

Vol. IV No. 5

MAY, 1922

PROPOSED ASSOCIATION OF GAS COMPANIES

THE proposed association will, if established, be beneficial alike to companies and consumers—to the companies, because it will produce a constant interchange of opinion on all matters connected with the economical management of gas-works, and to the consumers, because it will be the means of cheapening the cost of production, and so enable the companies to lower the price to them. It will serve to remove those prejudices which are founded in ignorance, and which are as vexatious to the managers of gas companies as they are irritating to the gas consumers, for it will enable those who possess the proper information to enlighten the public, by spreading before them from time to time, such explanations as cannot fail to convince the intelligent that a business which requires so much capital and such nice scientific management, must, to be prosperous, be honestly as well as ably conducted.

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60 Years Ago

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FOR STATEMENTS AND OPINIONS CONTAINED IN PAPERS AND DISCUSSIONS APPEARING HEREIN, THE ASSOCIATION DOES NOT HOLD ITSELF RESPONSIBLE

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American Gas Association Monthly

Vol. IV MAY, 1922 No. 5

From a letter to the Editor:

"The February issue of the Monthly has just come to my attention. I have read the opening article and, in consequence, have suffered a 'slight touch of the horrors.'

"What are the gas companies doing to attract the technical man? In my short experience—practically nothing.

"It is safe to say that, with the possible exception of college professors, there is no less remunerative employment for the technical man today than service with a gas company.

"Pay the price for technical training—and you can get the men, good men. There will be a demand upon universities to establish courses to train men for these good jobs; a demand from prospective students, not from the gas industry."

All questions have two sides. Has this man accurately presented one side of the question?

Let us consider this, especially at this time when we are striving to inaugurate courses in our universities and schools for prospective technical gas men—when we are endeavoring to interest these universities and schools sufficiently to enlarge their plan of instruction to meet our needs.

To meet our needs!

The gas industry will always have the need for well-trained technical men—the better trained at the start, the greater their value to their employers.

But will not the creation of such a supply depend upon the prospects held out to all who seek admission to this field? Will not our educational movement reach the pinnacle of success when such training is demanded by the neophytes? When there is an army of such applicants?

But who would enlist in such an army if there is nothing held out as an attraction for the future?

We appreciate that this is but one side of the question, but is it not worth serious consideration?

AMERICAN

GAS ASSOCIATION

MONTHLY

Vol. IV MAY, 1922 No. 5

Estimation of Hot Water Demand and Selection of Correct Heater Size to Meet Requirements

N. T. SELLMAN, Service Engineer, A. G. A.

THE first part of this article will deal only with data and methods of estimating hot water requirements and size of equipment where storage systems are being considered. Supplying hot water instantaneously is an entirely different problem and will be dealt with separately.

In order to substantiate the data in this article we will present the findings of various investigations, which instigated the publishing of this information in an entirely new form.

When gas water heating was first considered for large buildings, we, as gas men, were at a loss to give accurate estimates or to even select the best equipment to meet the various demands. Some of us might have realized that large quantity heating had to be done by storage heaters, but we surely did not have the equipment or the knowledge of requirements to tackle these jobs unabashed.

It soon became apparent that we had to collect data and even make trial installations. We first tried to find out what the coal boiler man knew about hot water requirements. The result was a revelation as to the diversity of methods employed and utter lack of unit cost data. We, as gas men, could never make any progress in water heating on this basis. Since our fuel cost is too high to allow haphazard selection of heater size, we have to take advantage of every factor that means increased efficiency of the entire heating plant as a unit if we are to compete with lower priced fuels.

The next step, therefore, was to collect accurate data and then to analyse

this with a view to determining the effect of various items on the over-all efficiency of a storage water heating system.

The items investigated were as follows:

1. How to select the correct heater size, this led to:
   (a) Quantity of hot water used in all classes of buildings (Affects heater size).
   (b) Way in which this water was used (i.e.) when did the biggest demand occur and what was the duration of this load (Affects tank size).
   (c) Effect of heater size on efficiency.
2. Value of covering.
3. Best piping conditions.
4. Most suitable types of thermostats and their location.
5. Losses due to house circulating lines.
6. Most economical temperature at which to operate under various conditions.
7. Operation and installation features.

As there were no accurate figures available of hot water usage in various classes of buildings it became necessary to start metering water. A great deal of data on this subject was collected and added to later on by exchanging our findings with a "rust preventing" concern that was obliged to assimilate the same facts. Table No. 1 shows a few of the larger installations metered and it at once becomes apparent, from the lack of uniformity, that a unit figure per person, per fixture, etc., cannot be set. There are too many variables that enter into the problem to allow any such simple figure to be used if we wish to obtain any degree of accuracy. The following unit figures on hot water usage have, therefore, been compiled and are based on factors which take into account the many variables that affect water consumption. For instance, a 6 room house with one bath room will not ordinarily use as much water as a 6 room house with two bathrooms because the second case is, as a rule, a more expensive dwelling and inhabited by people who use more hot water. Likewise, the more expensive a restaurant meal, the more elaborate is the service and the greater the number of dishes used, consequently more hot water will be necessary per meal served.

TABLE GIVING THE GALS. OF HOT WATER USED PER 24 HOURS ON MAXIMUM DAY FOR PRIVATE HOUSES, AND APARTMENTS INCLUDING LAUNDRY REQUIREMENTS

Rooms to Suite	Number of Bath Rooms 1	2	3	4	5
1	60				
2	70				
3	80				
4	90	120			
5	100	140			
6	120	160	200		
7	140	180	220		
8	160	200	240	250	
9	180	220	260	275	
10	200	240	280	300	
11		260	300	340	
12		280	325	380	450
13		300	350	420	500
14			375	460	550
15			400	500	600
16				540	650
17				580	700
18				620	750
19					800
20					850

Gals. Hot Water—Per Person*

Max. ..... 60 gallons per day.
Average .....30 gallons per day

*The unit figures per person should not be used for estimating unless it is the only data available.

Hotels:

	Gallons Per 24 hours
Room with basin	10
Room with bath (and) (or) shower:	
Transient	40
Resident (Bachelor)	40
Resident (Women)	70
Resident (Mixed)	60
2 rooms, bath (and) (or) shower	80
3 rooms, bath (and) (or) shower	100
Public Bath	150
Public Shower	200
Public Basins	150
Public Basins with attendant	200
Slop sinks for cleaning purposes	30

Restaurants:

	Hand Dishwashing	Machine Dishwashing
Per Meal $ .50	.5	1.0
Per Meal $1.00	1.0	2.0
Per Meal $1.50	1.5	4.0

Lofts and Offices:

Per Person	
Office Help	2.0
Factory Help	5.0
Cleaning per 10,000 sq. ft.	30.0

As previously stated, next in importance to determining the quantity of hot water used is to understand just how and at what rate it is consumed during the 24 hours of the day. This led to taking hourly and even 15 minute readings during the entire day in order to determine the exact nature of the hot water demand in various classes of buildings. The hourly readings were then plotted as shown on Chart No. 1. Over the curve representing the actual hourly hot water usage on the maximum day was then laid out to scale the most suitable heater and tank size to take care of this load. The problem simply resolves itself into selecting a heater large enough to supply the amount of water used during the 24 hours and installing a tank large enough to store hot water in sufficient volume to supply the demand at those times, when this demand exceeds the heater output.

This method can only be used where actual hourly water meter readings have been taken, and therefore, a method had to be developed to treat such cases where no actual water readings can be secured. This was based on the experience gained from the many installation actually metered. Chart No. 2 was, therefore, prepared and shows four distinct classes of loads, which will cover practically all prospects encountered.

Each curve is based on a characteristic load of 1,000 gals. per day, the dotted line indicating the approximate hot water usage hour by hour. The solid line then represents the output of the heater for this load, the heater, in each case, being rated at 50 gals. per hour. A factor of safety, therefore, exists of 20% as the heater will supply $50 \times 24 = 1{,}200$ gals. per day which allows 200 gals. above the required 1,000 gals. The dotted line area shown in each case above the solid line will now be the storage volume necessary since it also represents the volume of water required in excess of the heater output during this time.

The first classification is hotels and all-day restaurants where the greatest hourly demand is figured at 1/15 of the daily load or at a rate of 66⅔ gallons per hour and this maximum rate may last for 6 consecutive hours. There are two such maximum demands per day but the time between these demands is sufficient to allow the storage system to recuperate. The storage capacity required in this case per 1,000-gal. daily load will, therefore, be $6 \times (66\frac{2}{3} - 50) = 100$ gals.

The second classification is for apartment houses, private dwellings and two-

meal restaurants. Here the maximum hour demand is 1/10 of the 24-hour usage or at the rate of 133⅓ gals. per hour and may last for 4 consecutive hours. The storage capacity required is, therefore, $4 \times (100 - 50) = 200$ gals. per 1000-gal. daily load.

The third classification is for office and loft buildings. Here the maximum hour demand is 1/7.5 of the 24 hour usage or at the rate of 133⅓ gals. per hour and may last for 2 consecutive hours. The storage capacity required is, therefore, $2 \times (133\frac{1}{3} - 50) = 166\frac{2}{3}$ gals. per 1,000-gal. daily load.

The fourth classification is for one-meal restaurants (quick lunch). Here the maximum hour demand is 1/5 of the 24-hour usage or at the rate of 200 gals. per hour and may last for 3 consecutive hours. The storage capacity required is, therefore, $3 \times (200 - 50) =$ 450 gals. per 1,000-gal. daily load.

As already stated all these typical cases are based on a 50 gal. per hour heater for a 1,000-gal. 24-hour load, which allows for an emergency factor of 20%. This 50-gal. heater is, therefore, the smallest size heater that can be installed and still allow for all emergencies. In the text to follow this smallest heater will be referred to as the "Minimum Heater Size."

It should be the effort of every salesman when recommending hot water storage heaters, to select the so-called minimum heater size because only then will the maximum efficiency be obtained. The effect of installing over-size heaters is very well shown by Chart No. 3, where it is clearly indicated that a heater and tank will operate most efficiently when delivering its rated output. In the various tests run by the writer this fact became so apparent that laboratory tests and actual figures from installations were examined to see just what the effect was on the gas consumption. From the chart it can be seen that the heater tested operated at about 85% efficiency when delivering full load. At half-load this was reduced to about 75%; at quarter-load about 60% and at one-eighth load about 45%. Having discovered this, many installations were examined to see if this held true in actual practice and the results are tabulated below:

A careful examination of the above table will show that, in the cases where

HOT WATER HEATING INSTALLATIONS

Type of Heater	Heater Capacity Gallons 24 Hrs.	Gallons Water Metered 24 Hrs.	Temp. Water Deg. F.	Covered or Uncovered	Circulating or Non-Circulating	Actual Overall Mont'y Efficiency	Remarks
Circulating	1500	251	122	Covered	Non.-Cir.	52.0%	Private House
Circulating	1500	159	129	Covered	Cir.	37.2	Private House
Circulating	1500	466	134	Covered	Cir.	48.1	Private House
Circulating	1500	208	130	Covered	Non.-Cir.	43.5	Private House
Circulating	1500	130	128.5	Covered	Non.-Cir.	37.6	Private House
Circulating	3000	348	124.4	Covered	Cir.	29.2	Store & Apts
Circulating	5500	2559	131	Covered	Cir.	74.4	Apt. House
Steam	7500	3917	133	Covered	Cir.	43.5	Office
Steam	12500	5365	161	Covered	Cir.	70.4	Hotel
Circulating	13500	2418	131.2	Uncovered	Cir.	40.2	Laundry*
Circulating	13500	2812	125	Covered	Cir.	59.1	Laundry*
Steam	20500	17662	160	Covered	Cir.	76.4	Hotel
Steam	20500	9480	140	Covered	Cir.	67.7	Loft Bldg.

*Same installation before and after covering.

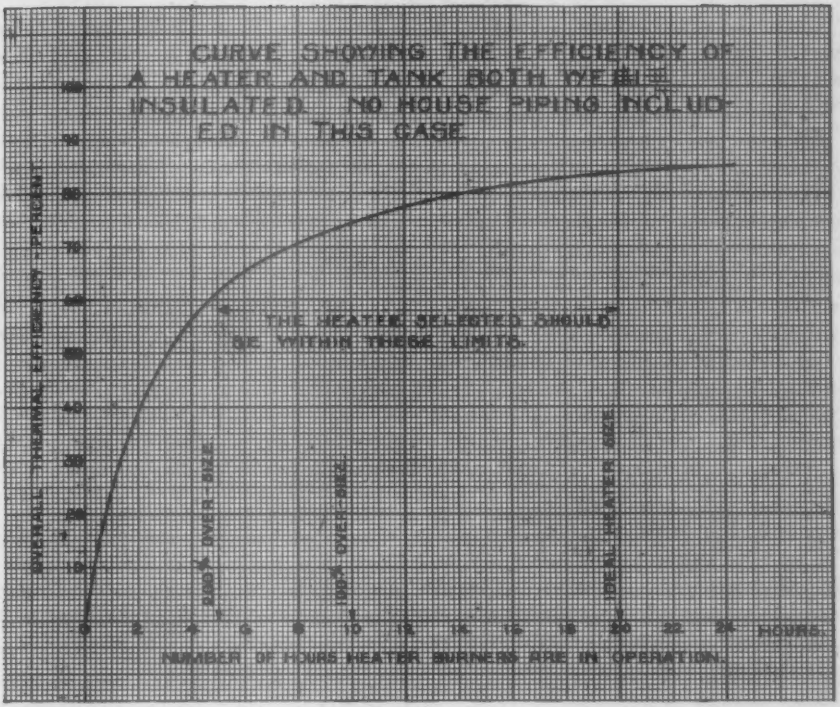

CURVE SHOWING THE EFFICIENCY OF A HEATER AND TANK BOTH OF WHICH INSULATED. NO HOUSE PIPING INCLUDED IN THIS CASE.
THE HEATER SELECTED SHOULD BE WITHIN THESE LIMITS.
HOURS
NUMBER OF HOURS HEATER BURNERS ARE IN OPERATION.

Chart No. 3.

the total quantity of water used was nearly equal to the full heating capacity of the heater, very high efficiencies were obtained. In the one case where the efficiencies are shown before and after covering, a saving of 19% is indicated. The wastefulness of circulating pipes on small installations is also very well brought out in some of the private homes listed.

The reason why the minimum heater size gives the greatest efficiency can be readily understood when we consider that the losses on any storage system consist mainly of, first, radiation loss, second, heater loss, which is due to the cooling effect of the cold air drawn through the heater when the burners are not in operation. Of the two above losses the radiation loss is the most easily eliminated as it can readily be taken care of with a good covering. The heater loss, however, which is the greater of the two, in most cases can only be taken care of by making the heater operate as nearly continuously as possible. It is for this reason that the entire plan, as laid out in this paper for selecting heater equipment, resolves itself into first, selecting the minimum heater size which will satisfactorily deliver the required amount of water during the 24 hours and then installing a storage tank of sufficient capacity to carry the heater over the heavy demands that occur during the day.

Charts Nos. 4, 5, 6 and 7 have been worked out so that we can instantly select the right size heater and storage tank for any type of installation.

For example, let us assume that, having used the figures as given on page 260, we estimate the total quantity of hot water that will be used in a certain apartment house to be 8,000 gallons per day. If we now refer to curve No. 2 on Chart No. 2, we get the characteristic load for apartment houses. On Chart No. 5, we will then find the heater and tank size all worked out for this classification. As we assumed our load to be 8,000 gals. per 24 hours, read up the vertical line at 8,000 until you intersect the minimum heater size, then reading on a horizontal line to the left, you find that the heater required for this load will be one rated at 400 gals. per hour and reading up the inclined line, which intersects the minimum heater size at 8,000 gals., you find that the storage capacity should be 1,600 gals.

Let us now assume that the tank was already installed in this case and consisted of only 1,000 gals. capacity. Then you start at 1,000 gals. at the upper right hand corner and read down the inclined line until you intersect the 8,000 gals. line. Now read along a horizontal line to the left and you find that it will be necessary to install a 550 gal. per hour heater.

It is needless to say, however, that the first installation with 1,600 gals. storage capacity and the heater with a rating of 400 gals. per hour would make a more efficient installation than the latter case, when the storage capacity is 1,000 gals. and the heater capacity 550 gals. per hour.

To further illustrate the use of these charts, let us assume another case of a transient hotel having 150 rooms with bath and with an all-day restaurant that serves approximately 600 meals per day, at an average price of $1.50 per meal. The kitchen is, however, equipped with a dish washing machine. From the figures given on page 261, the 150 rooms, with bath, will require 150 x 40 = 6,000 gals. per day. The restaurant will require 600 x 4 or 2,400 gals. per day and further, we will assume that the floor area is such that the cleaning necessities will require an additional 600 gals. per day. The total water consumption in this case will, therefore, be 9,000 gals. per 24 hours.

Referring to the chart for hotels, Chart No. 4, you read up the vertical line at 9,000 until it intersects the minimum heater size. Then reading on a horizontal line to the left you find that the heater required should have a rating of 450 gals. per hour, and reading up the inclined line to the upper right hand corner you find that the storage capacity required will be 900 gals. This, again, will be the best proportioned and efficient installation for this case.

Chart No. 8 can be used for determining the gas consumption required after the heater size has been determined in gallons per hour. For example, let us use the case of the hotel mentioned above where our total load was 9,000 gallons and where the heater size required was 450 gallons per hour. Let us allow a maximum temperature rise of 90 deg. F. and assume the calorific value of the gas to be 600 B.t.u. If we take the intersection of the 600 B.t.u. curve with the 90 deg. rise line and then

read down a vertical line, we find that this represents .64 gal. per cubic foot of gas. Therefore, if we divide the heater rating in gallons by .64 we will get the gas consumption required for our heater which, in this case, will be 450 ÷ .64 = 703 cubic feet of gas per hour. To summarize this example, then, the proper installation will be a heater having an hourly consumption of 703 cubic feet of gas per hour and a storage tank with 900 gals. capacity.

It must be clearly understood that all these charts and the estimation of hot water demand on the 24-hour basis is limited entirely to storage water heaters, and furthermore, it is practically limited to gas water heaters because it it quite essential for close figuring, such as this, that the heater have a fixed output, hour by hour, as is the case with gas heaters.

A coal heater having indefinite firing periods must of necessity be much larger in order to take care of human factors of neglect and it will, therefore, not be advisable to use this close method of estimating when coal is the fuel.

The writer has had ample opportunity to try out the data and charts as presented in this paper from all angles—its value for estimating the quantity of hot water that is being used, for selecting the most efficient equipment for the installation and for estimating the gas consumption that may be expected. The writer does not hesitate to make the claim that if consideration is given to all the details mentioned in this paper, storage systems having an overall efficiency for the entire year of better than 60% can easily be attained when using any heater showing 80% efficiency on a straight circulating test. Although the examples used in the preceding text were for large buildings, it should not be interpreted that this data is not equally applicable to private dwellings.

Selecting the Correct Size Automatic Instantaneous Heater

Practically all manufacturers of this type of heater, catalogue the following sizes, 2½, 3, 4, 6 and 8. The numbers indicate the approximate number of gallons per minute that can be heated through a 60 deg. F. rise.

The heater size to be selected for any installation depends upon the maximum flow of hot water that it will be required to supply at any one time. This naturally means, how many hot water faucets may be operated at the same time and still each be expected to give a reasonable flow of water at a desireable temperature? The number of hot water fixtures that can be taken care of, therefore, depends upon the flow, and as an average figure this can be taken at 2 gals. per minute per fixture. The following table shows the maximum number of fixtures that can be in use at one time and be properly supplied by each size of heater.

Heater Number gals. per minute	Approximate gas cons. cu. ft. per hr.	Max. Number of fixtures in use at one time
2½	150	1
3	180	1
4	240	2
6	360	3
8	480	4

As a rule, this means that the total number of hot water fixtures may be approximately four times the above allowable, as it is unusual for more than 25 per cent of the fixtures to be in use at any one time.

Data on H.W. Consumption in Buildings for 100% Occupancy.

Gallons H.W. per Day.

Type of Building	Number of Fixtures							Number of			Total Hot Water	Hot Water per				
	Baths	Basins	Kitchen Sinks	Slop Sinks	Laundry Tubs	Shower	Total	Apts.	Rooms	Occup'ts		Fixture	Person	Apt.	Max. Hr.	Ratio of Max. Hr. to Total
12 Story Apartment West	271	300	220		140	166	1297	66	1012	553	23000	17.8	41.6	383.0	2100	1:10.9
12 Story Apartment East	158	288	88		77	126	738	37	657	353	10000	13.6	28.4	270.0	1000	1:10.0
18 Story Apartment	151	230	87	52	99		589	33	508	227	14500	24.6	64.0	440.0	1500	1:9.7
12 Story Apartment	93	178	41	2	77	66	455	25	301	148	13000	28.6	86.0	565.0	1350	1:9.6
14 Story Apartment	84	120	55		45	39	353	28	328	137	8030	22.7	40.8	286.0	807	1:9.9
12 Story Apartment	132	132	96	48	30		438	49		200	10700	24.4	53.5	218.0	970	1:11.0
13 Story Apartment	101	160	52		48	72	435	27	488	188	8600	20.0	45.5	319.0	840	1:10.2
12 Story Apartment	102	137	75		84	45	453	61	521	286	8500	21.0	35.4	166.0	1200	1:7.9
13 Story Apartment	153	168	147		176		641	84	473		14585	22.7		155.0	1163	1:12.5
Average	137	218	97	27	88	66	601	46	535	267	12435	21.7	44.1	310.2	1214	1:10.2
12 Story Apartment.	48	81	50		52	48	280	48	266	185	4800	16.5	36.4	99.0	450	1:10.7
12 Story Apartment	37	62	30		65	36	238	37	244	135	3660	15.2	27.1	99.0	270	1:13.6
8 Story Apartment	33	74	34		66	32	233	33	236	143	3000	12.8	21.0	91.0	390	1:7.7
Average	40	66	41		61	38	246	40	248	134	3820	15.4	28.8	96.3	370	1:10.3
Central Plant 600 Houses.	500	500	500		1000		2550		4900	3000	53110	20.4	17.7		5085	1:10.6
13 Story Hotel	385	533	100	105	60	13	1806		660	1382	97350	61.0	70.0		7400	1:13.2
14 Story Hotel	540	733	10	55		75	1418		600		115000	81.0			8625	1:13.3
12 Story Hotel	155	170	7	10		154	496		650		16232	32.0			1050	1:15.5
Average	360	479	39	57	60	81	1040		703	1382	78194	650	70.0		5692	1:13.4
10 Story-Office-Bldg.		256				1	257		235		1545	6.5			195	1:7.9
16 Story-Office-Bldg.		72	Misc. 35	50		2	158			7000	7500	47.7	1.07		1100	1:8.8
Average		164	35	50		2	208		235	7000	4523	27.1	1.07		648	1:7.0

Table No. 1.

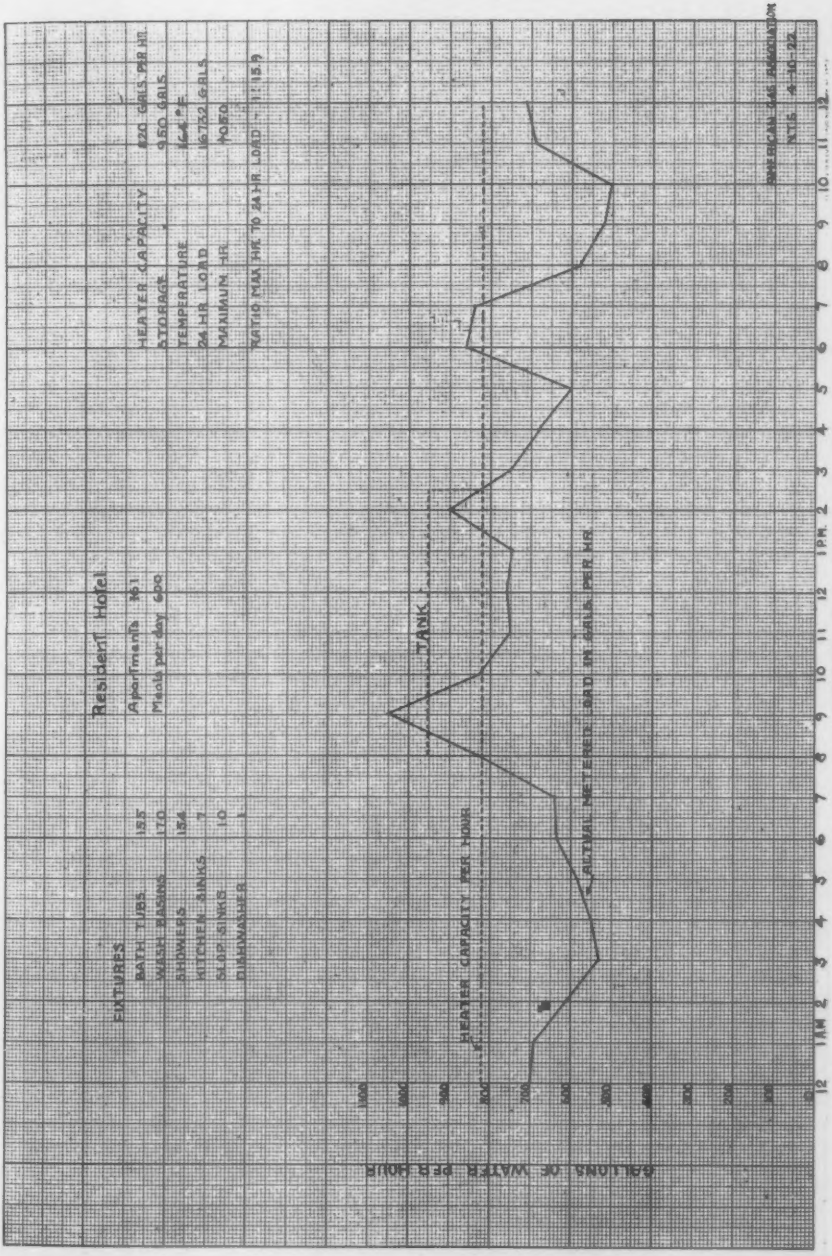


Chart No. 1.

Table No. 1.

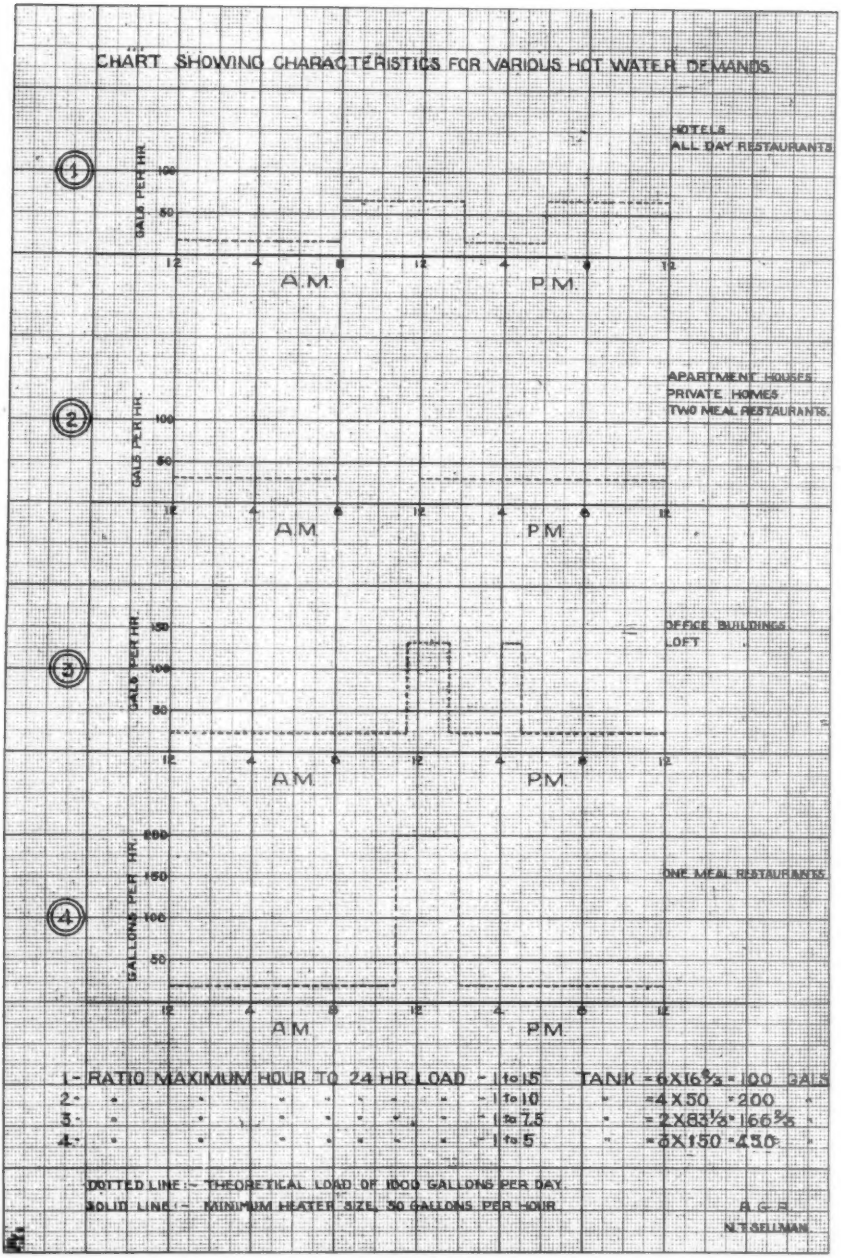


CHART SHOWING CHARACTERISTICS FOR VARIOUS HOT WATER DEMANDS.
1
GALS PER HR.
100
50
12
4
8
12
4
8
12
A.M.
P.M.
HOTELS
ALL DAY RESTAURANTS.
2
GALS PER HR.
100
50
A.M.
P.M.
APARTMENT HOUSES
PRIVATE HOMES
TWO MEAL RESTAURANTS.
3
GALS PER HR.
150
100
50
A.M.
P.M.
OFFICE BUILDINGS
LOFT
4
GALLONS PER HR.
200
150
100
50
A.M.
P.M.
ONE MEAL RESTAURANTS.
1 - RATIO MAXIMUM HOUR TO 24 HR LOAD - 1 to 15 TANK = 6X16⅔ = 100 GALS
2 - " " " " " - 1 to 10 " = 4X50 = 200 "
3 - " " " " " - 1 to 7.5 " = 2X83⅓ = 166⅔ "
4 - " " " " " - 1 to 5 " = 3X150 = 450 "
DOTTED LINE :- THEORETICAL LOAD OF 1000 GALLONS PER DAY.
SOLID LINE :- MINIMUM HEATER SIZE, 50 GALLONS PER HOUR
A. G. A.
N. T. SELLMAN

Chart No. 2.

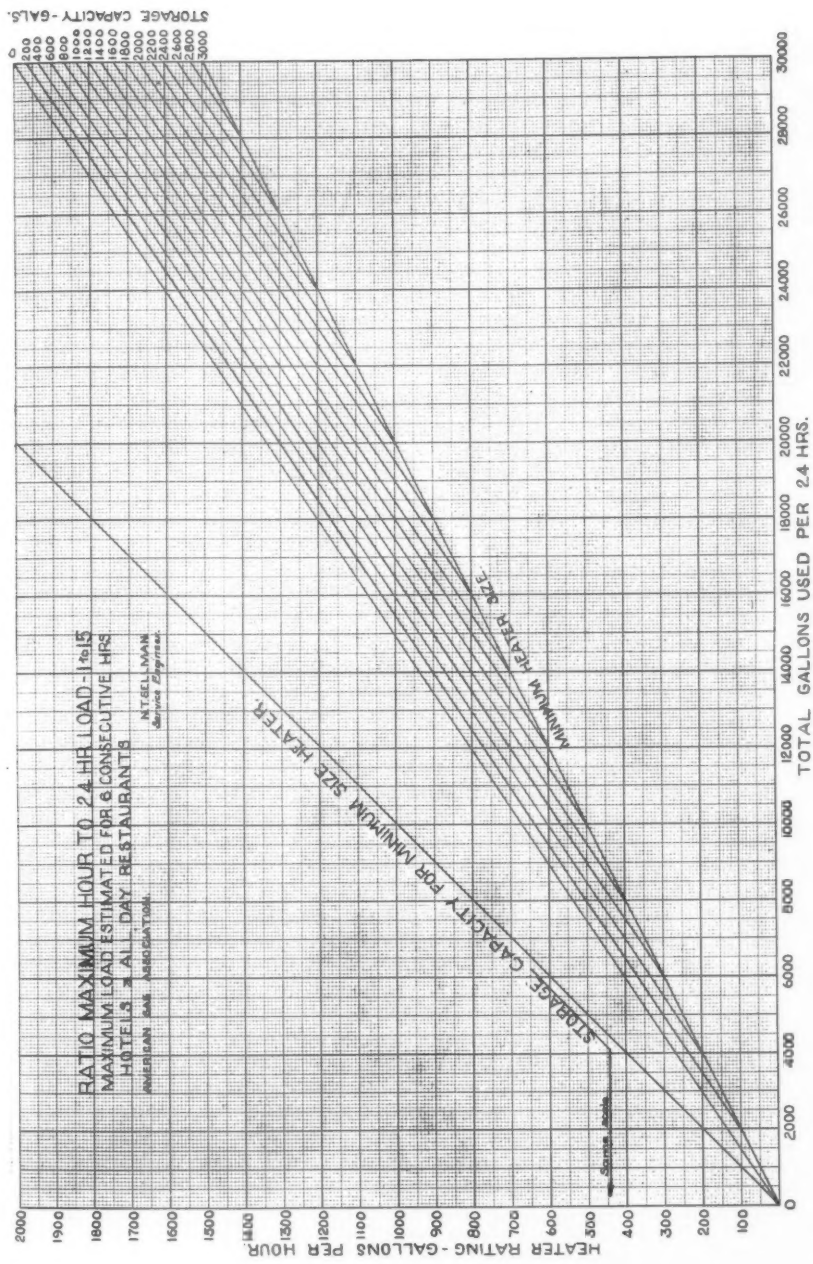

RATIO MAXIMUM HOUR TO 24 HR. LOAD - 1 to 15
MAXIMUM LOAD ESTIMATED FOR 6 CONSECUTIVE HRS.
HOTELS & ALL DAY RESTAURANTS
AMERICAN GAS ASSOCIATION
N. TELLMAN
Gauge Engineer
STORAGE CAPACITY FOR MINIMUM SIZE HEATER.
MINIMUM HEATER SIZE
Same scale
HEATER RATING - GALLONS PER HOUR
TOTAL GALLONS USED PER 24 HRS.
STORAGE CAPACITY - GALS.

Chart No. 4.

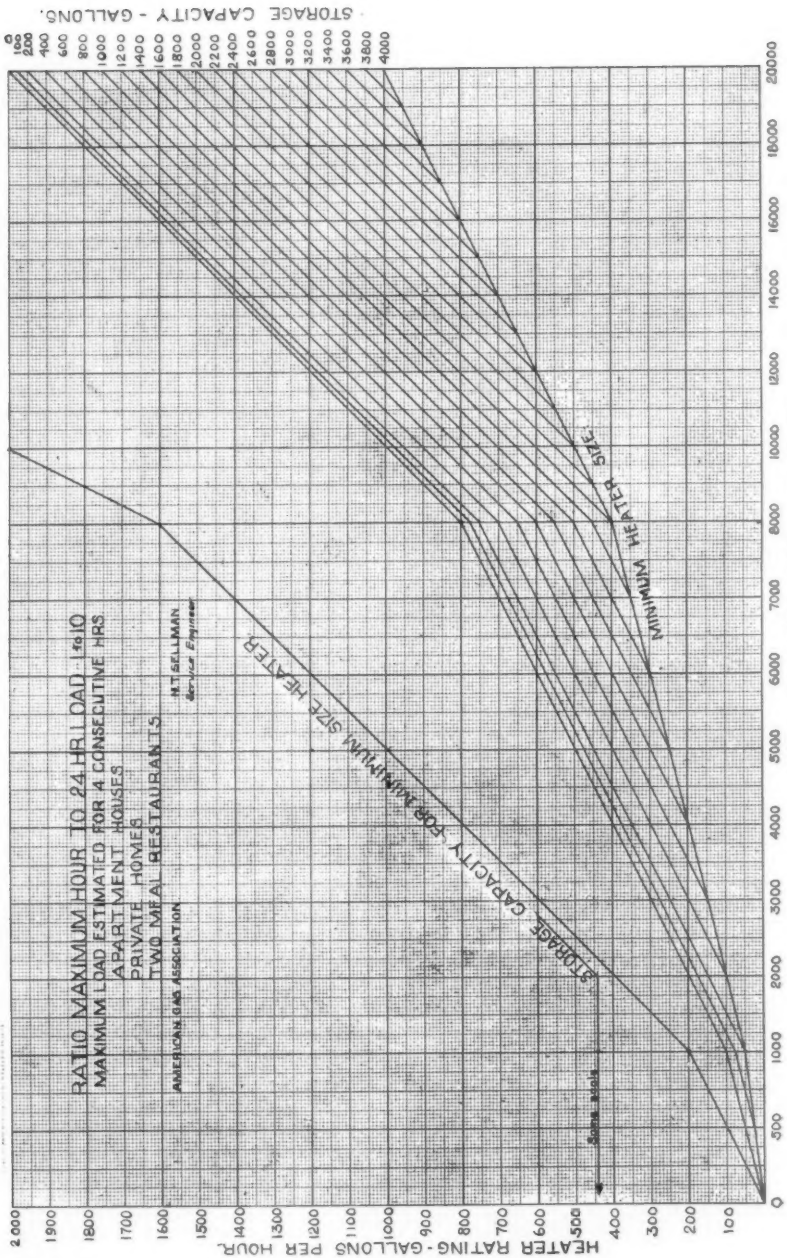
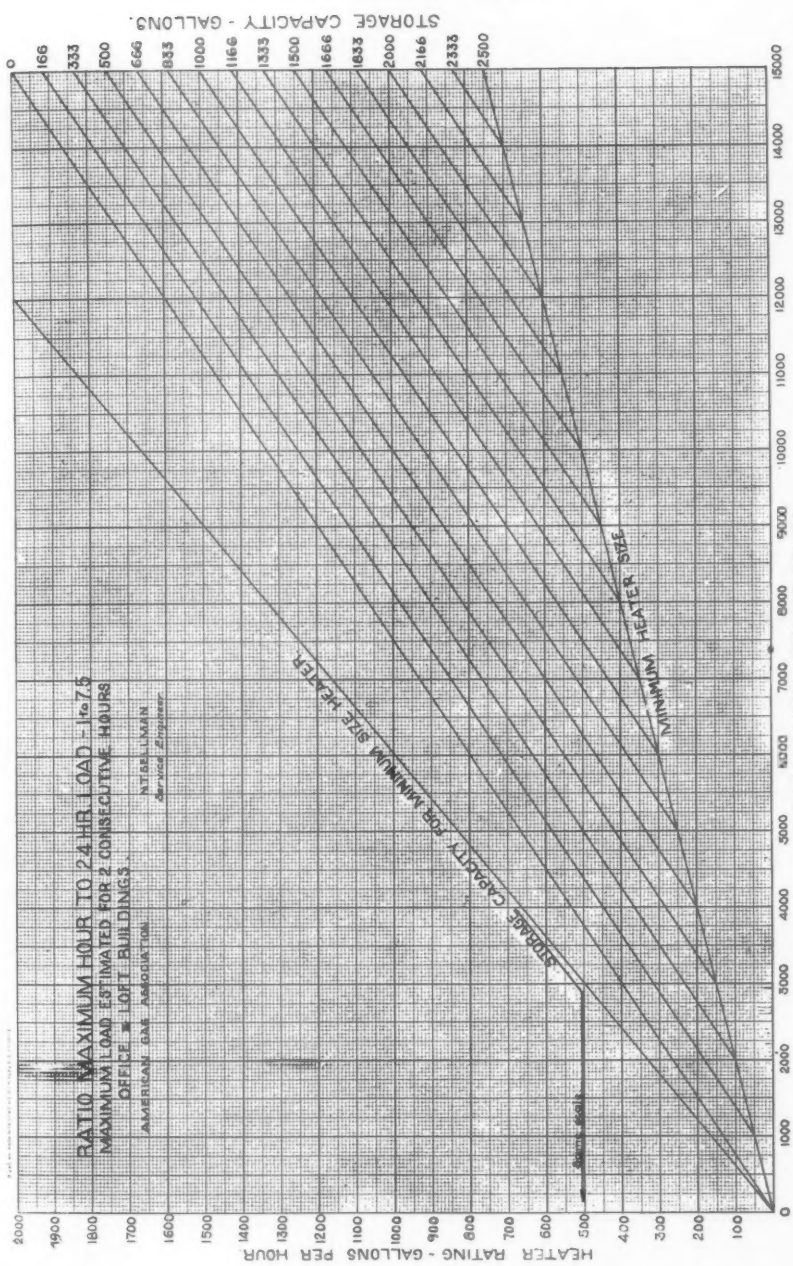

RATIO MAXIMUM HOUR TO 24 HR. LOAD 1 to 10
MAXIMUM LOAD ESTIMATED FOR 4 CONSECUTIVE HRS.
APARTMENT HOUSES
PRIVATE HOMES
TWO MEAL RESTAURANTS
AMERICAN GAS ASSOCIATION
H.T. SELLMAN
Service Engineer
STORAGE CAPACITY FOR MINIMUM SIZE HEATER
MINIMUM HEATER SIZE
STORAGE CAPACITY - GALLONS
HEATER RATING - GALLONS PER HOUR
TOTAL GALLONS USED PER 24 HRS.

Chart No. 5.


RATIO MAXIMUM HOUR TO 24 HR. LOAD - 1 to 7.5
MAXIMUM LOAD ESTIMATED FOR 2 CONSECUTIVE HOURS
OFFICE & LOFT BUILDINGS.
AMERICAN GAS ASSOCIATION
M.T. BELLMAN
Consulting Engineer
STORAGE CAPACITY FOR MINIMUM SIZE HEATER
MINIMUM HEATER SIZE
HEATER RATING - GALLONS PER HOUR
TOTAL GALLONS USED PER 24 HRS.
STORAGE CAPACITY - GALLONS.
Chart No. 6.

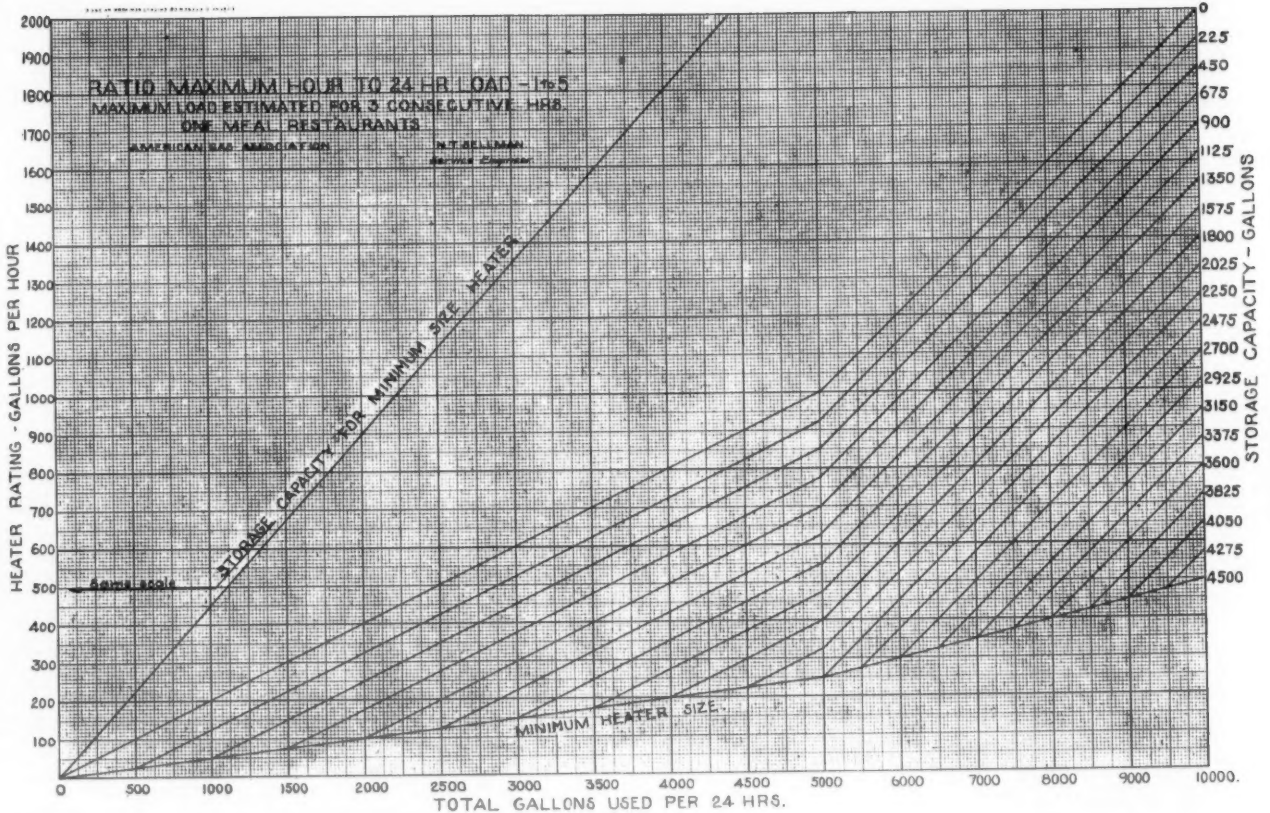

RATIO MAXIMUM HOUR TO 24 HR LOAD - 1 to 5
MAXIMUM LOAD ESTIMATED FOR 3 CONSECUTIVE HRS.
ONE MEAL RESTAURANTS
AMERICAN GAS ASSOCIATION
N.T. BELLMAN
STORAGE CAPACITY FOR MINIMUM SIZE HEATER
MINIMUM HEATER SIZE
HEATER RATING - GALLONS PER HOUR
STORAGE CAPACITY - GALLONS
TOTAL GALLONS USED PER 24 HRS.
0 500 1000 1500 2000 2500 3000 3500 4000 4500 5000 6000 7000 8000 9000 10000.
100 200 300 400 500 600 700 800 900 1000 1100 1200 1300 1400 1500 1600 1700 1800 1900 2000
0 225 450 675 900 1125 1350 1575 1800 2025 2250 2475 2700 2925 3150 3375 3600 3825 4050 4275 4500

Chart No. 7.

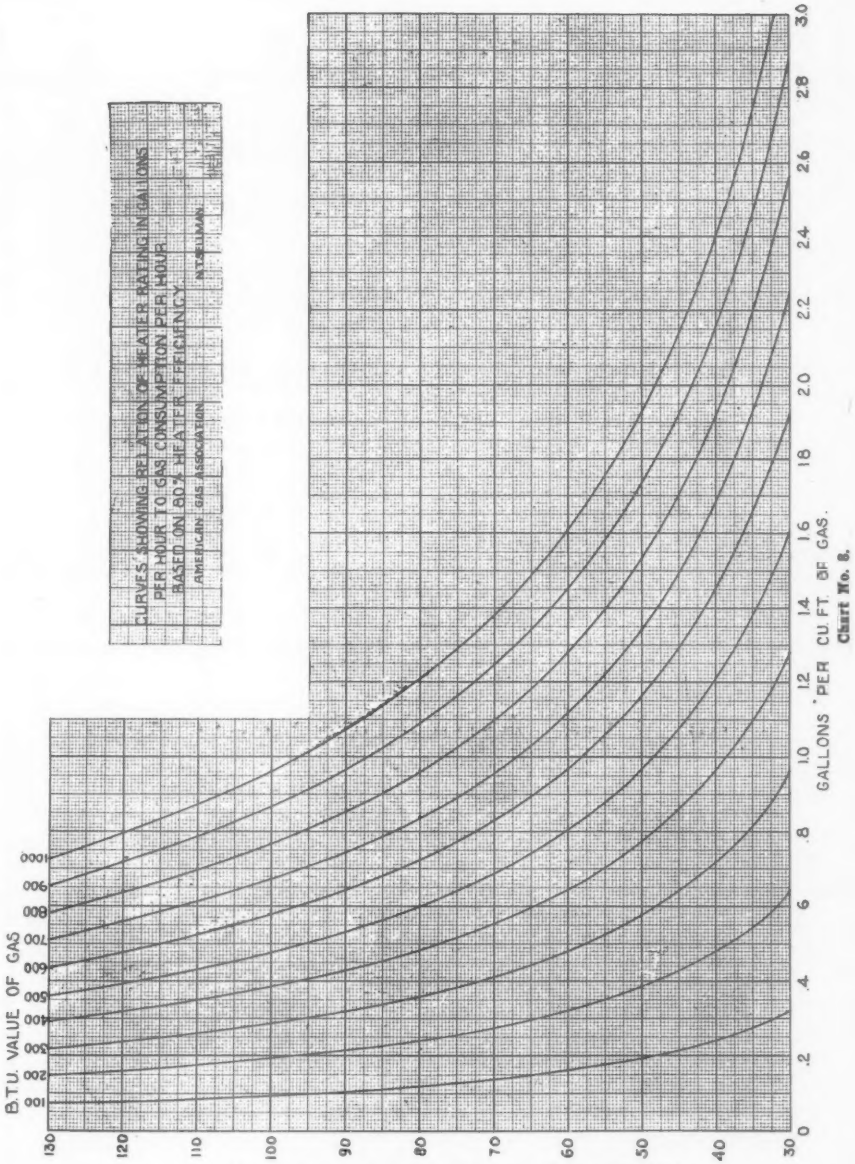

CURVES SHOWING RELATION OF HEATER RATING IN GALLONS PER HOUR TO GAS CONSUMPTION PER HOUR BASED ON 80% HEATER EFFICIENCY.
AMERICAN GAS ASSOCIATION
N.T. BELLMAN
B.T.U. VALUE OF GAS
100
200
300
400
500
600
700
800
900
1000
TEMPERATURE RISE OF WATER - DEGREES FAHRENHEIT.
130
120
110
100
90
80
70
60
50
40
30
0
.2
.4
.6
.8
1.0
1.2
1.4
1.6
1.8
2.0
2.2
2.4
2.6
2.8
3.0
GALLONS PER CU FT. OF GAS.

Chart No. 8.

Rate Lists

Some time during May we propose to distribute our No. 9 Cumulative Rate List which, under a recent ruling of the Executive Board, all member companies will receive without charge.

The No. 9 list will record the rates of all gas companies which have supplied this information to the American Gas Association and its predecessor, the American Gas Institute, since July, 1917, and includes such changes as have taken place during that period.

It is proposed to discontinue the issuance of Cumulative Rate Lists with the No. 9 issue and thereafter to publish every six months in pamphlet form only the current rates in effect at the time each list is published.

Under this arrangement there will be available twice a year an up-to-date list of rates of all gas companies that supply such information to this office.

A limited number of copies of the No. 9, the last of the Cumulative Lists, will be available for purchase at the following prices:

Single copies	50¢ each
Four or more	40¢ each
Twenty or more	30¢ each

Indiana Gas Association Convention

The Indiana Gas Association has laid out a very attractive program for its coming convention at West Baden Springs Hotel, West Baden, Indiana, on Monday and Tuesday, May 8th and 9th.

Some of the addresses will be—"The One Thing to Remember in Selling," by Richard M. McClure, Secretary of the Department of Service of the International Association of Rotary Clubs, "How to Fail," by F. D. Van Amburg, Editor and Manager of The Silent Partner. In addition, there will be many interesting papers on gas appliance merchandising and kindred subjects. The entire program should be very inspiring.

GENERAL

CHAIRMEN OF GENERAL COMMITTEES ORGANIZED TO DATE

Accident Prevention—CHARLES B. SCOTT, Chicago, Ill.
Amendments to Constitution—WM. J. CLARK, Mt. Vernon, N. Y.
American Engineering Standards Committee, Representative on—A. H. HALL, New York, N. Y.—(Alternate Representative) W. J. SERRILL, Philadelphia, Pa.
Award of Beal Medal—D. D. BARNUM, Boston, Mass.
Calorific Standards—J. B. KLUMPP, Philadelphia, Pa.
Chamber of Commerce, Membership in—CHARLES A. MUNROE, Chicago, Ill., National Councillor.
Cooperation with Educational Institutions—F. C. WEBER, New York, N. Y.
Finance—E. H. ROSENQUEST, New York, N. Y.
Gas Safety Code—W. R. ADDICKS, New York, N. Y.—(Alternate Representative) DONALD McDONALD, New York, N. Y.
National Fire Protection Association—W. R. ADDICKS, New York, N. Y.
Rate Fundamentals—R. A. CARTER, New York, N. Y.
Rate Structure—J. D. SHATTUCK, Chester, Pa.
Standard Gas Appliance Specifications—W. T. RABCH, New York, N. Y.
United States National Committee of the International Commission on Illumination, Representative on—HOWARD LYON, Gloucester, N. J.
Nominating—A. P. Lathrop, New York, N. Y.

A Course in Gas Engineering

A COURSE in gas engineering with a complete gas production station as an experimental plant is to be established by the University of Illinois to meet the demand for technically trained men to enter the manufactured gas industry, according to the announcement today of Dean C. R. Richards of the College of Engineering.

In announcing a four-year curriculum, Dean Richards made public that Samuel Insull, President of the Peoples Gas Light & Coke Company, of Chicago, had offered to place at the university's disposal a complete gas plant. Mr. Insull's action follows the offer of co-operation made before the meeting of the National Educational Association, where he made a plea for more practical education of university and college students. In accepting the offer Dean Richards said:

> "I hope that the gas industry will become sufficiently interested in the curriculum to herald it to the country. The manufactured gas industry is one of the most important of the nation and with the increasing demands for concentrated, economical fuel, the industry's demand for technically trained men will correspondingly grow. This has become increasingly so with respect to use of gas in industrial processes due to the war experience with this economical fuel and the increasing necessities of coal conservation."

In outlining Mr. Insull's offer of co-operation, Charles A. Munroe, Vice-President of the Peoples Company, wrote Dean Richards that "100 per cent co-operation can be expected from the gas company" and said:

> "The Peoples Gas Light and Coke Company will furnish employment to a large number of the student body during the vacation time where they can have actual experience in and around gas plants.
>
> "It will turn over a complete gas production station as an experi-

mental plant, so that the entire class can be moved to Chicago and the plant experimented with under actual operating conditions, using various grades of oil and various kinds of fuel.

"We would also consider contributing sufficient money to reimburse the student body for their expenses while they are engaged in such experiments. This could be done by paying them wages in some proper relation to the wages paid the class of labor which they would displace.

"In addition to the water gas plant, we are indirectly interested in a very modern coke over plant, and in connection with this there have been constructed experimental ovens. It is quite probable that arrangements could be made for the use of these ovens for experimental work provided you desire to conduct your experiments along the line of coking of coals rather than the improvements of carburetted water gas practice."

Dean Richards announced that the early part of the course will include general engineering and chemical engineering subjects, and the latter part of it will include special gas engineering problems, such as gas manufacture, distribution, utilization and economics.

In addition, the Committee on Co-operation with Educational Institutions of the American Gas Association is prepared to fully co-operate with the University of Illinois in an advisory capacity, in supplying speakers and in assisting in selecting the curriculum for such a course.

Columbia University Will Give Summer Course in Gas Engineering

Columbia University in the City of New York announces a course in the "Manufacture and Distribution of Illuminating Gas" to be given during the Summer Session, which opens on July 10th 1922 and will continue until August 18th 1922. The course is open to those who have received training in general chemistry or have had practical experience in the manufacture and distribution of illuminating gas.

Professor J. J. Morgan, who has devoted special study to the utilization of fuels and the manufacture of illuminating gas, is in personal charge of this course. At the request of the Committee on Co-operation with Educational Institutions he has furnished the following description of the work contemplated:

"It is planned to give in some twelve to fifteen lectures the theory of the manufacture and purification of illuminating gas, including a discussion of raw materials and by-products, and with illustrations from practice of standard forms of apparatus. Without overlooking developments and chances for further development on the mechanical side, it is intended to stress rather strongly the

(Continued on page 320)

ACCOUNTING SECTION

EWALD HAASE, Chairman — J. W. HEINS, Vice-Chairman

H. W. HARTMAN, Secretary

MANAGING COMMITTEE—1922

At Large

DAVIDSON, H. C., New York, N. Y.
DOERING, W. A., Boston, Mass.
LAWALL, H. J., Philadelphia, Pa.
LAWRENCE, JAMES, New York, N. Y.
MEYERS, W. J., New York, N. Y.
PETTES, W. H., Newark, N. J.
SAUER, W. A., Chicago, Ill.
SCHMIDT, JR., WM., Baltimore, Md.
SCOBELL, E. C., Rochester, N. Y.
SMART, BURTON, Portland, Me.
STERRETT, W. G., Chester, Pa.
WILSON, P. A., Philadelphia, Pa.

Representing Affiliated Societies

ARMSTRONG, J. J., Toronto, Can. (Canadian)
BORDEN, A. W., Hastings, Nebr. (Iowa)
DEAL, E. C., Springfield, Mo. (Missouri)
HAASE, EWALD, Milwaukee, Wis. (Wisconsin)
HOUGHTON, W. E., Los Angeles, Cal. (Pacific Coast)
HOY, CHAS. W., Glassboro, N. J. (New Jersey)
JAMES, F. M., Aurora, Ill. (Illinois)
McCABE, J. B., Dallas, Tex. (South Central)
NORTON, W. F., Nashua, N. H. (N. E. Gas Eng.)
PORTER, EDW., Philadelphia, Pa. (Pennsylvania)
SCOBELL, E. C., Rochester, N. Y. (Empire State G. & E.)
SHEARON, B. P., Hammond, Ind. (Indiana)
STOTHART, E. C., Charleston, S. C. (Southern)
SWANSON, J. K., Jackson, Mich. (Michigan)

CHAIRMEN OF SECTION COMMITTEES ORGANIZED TO DATE

Consumers Accounting—W. A. DOERING, Boston, Mass.
Continuous Inventory of Fixed Capital—H. C. DAVIDSON, New York, N. Y.
Fire Insurance Rates—P. A. WILSON, Philadelphia, Pa.
Nominating—W. H. PETTES, Newark, N. J.
Standard Classification of Accounts—W. J. MEYERS, New York, N. Y.
State Representative—W. A. SAUER, Chicago, Ill.

Establishment of Appliance and Merchandise Selling Prices by Proper Accounting Procedure

W. H. BARTON, Office Manager, Portland Gas & Coke Company, Portland, Oregon.

THE general practice in establishing sales prices on gas appliances has probably been on a more or less hit or miss basis. In some cases gas appliances are retailed at list prices dictated by the manufacturers regardless of the gas company's actual overhead. In other cases, the prices have simply been built up from year to year by varying them according to the net appliance earnings. If the earnings over a given period were gratifying, the prices were lowered arbitrarily, or if the earnings were inadequate, the prices were raised without proper analysis. In the absence of a thorough analytical study of overhead costs, certain appliance expenses are often borne by gas operations such as "no charge" repairs, or "go back" calls.

As a general proposition, it should be possible to control the percentage of profit from merchandise and jobbing sales in any given year regardless of the volume of sales, provided the actual overhead expenses are known and properly covered in the percentage of overhead added to appliance and installation costs.

The various sales and installation costs reports of many companies do not contain subdivisions of accounts which will enable one to arrive at the overhead expenses, which necessitates the making up of additional analyses of different general ledger accounts in order to secure this information, which in itself works against the frequent scrutiny of overhead costs.

What action is to be taken when appliance, merchandise and jobbing sales show a loss or inadequate net revenue? One of three things must be done: increase sales prices, reduce expenses, or increase the volume of business. To increase the volume is usually difficult, involving the expenditure of additional funds. To reduce expenses is also difficult, especially if one has been operating closely. Therefore, as a rule, the only alternative is to increase prices and the question is, how to arrive at an accurate percentage of increase rather than an arbitrary one.

An analysis should be made of the overhead expenses for a given period, preferably a year. It will usually be found that such expenses are a higher percentage than the percent which has been added to the appliance and installation costs during the period. After the analysis has been completed, plans for the following twelve months should be made by estimating the gross volume of business which can be anticipated, such figure to be net, making allowance for the credits to be deducted for corrections and appliances returned for credit. Such total should then be subdivided by months on the basis of the relation of each previous month's sales to the annual sales for a period of say, five years. An estimate should then be made by months showing the various overhead expenses permissible for such volume of business, the analysis of the actual overhead expenses for the previous year being a good basis from which to work. These estimated figures should then be set out on reports so designed that the actual monthly costs as they occur can be set down opposite the estimated figures and the differences shown.

In this way it is possible to watch the overhead expenses and if excessive, the causes thereof can be readily traced. Intelligent steps can then be taken to reduce them or it may be necessary to increase the percentage of overhead on sales prices if such excessive costs continue and are of sufficient volume to warrant a change. Likewise, the actual monthly gross sales can be shown opposite the estimated sales and in the event, over a reasonable period, there is a large increase or decrease, it would be necessary to recalculate the percentage of overhead accordingly.

All of this deals primarily with overhead expenses. Increases in the cost of appliances, or in the installation costs, should be very carefully watched and promptly reflected in the sales prices of the appliances affected. Unless proper co-operation is secured from the stores ledgers bureau or superintendent of supplies, the sales manager may find, to his sorrow, that the more he sold of a certain appliance, the more he lost.

Individual work order cost keeping methods should be in use and reports made monthly showing the average cost of installing the various kinds of appliances. The price clerk in the sales department should not only watch the notices of appliance and installation cost increases, analyses of revenue accounts, etc., but keep in constant touch with the various bureaus and individuals involved to make doubly sure that there are no loopholes in the system and that all work is being carried on in accordance with the system.

The Portland Gas & Coke Company takes all jobbing orders on the "actual cost" basis, which greatly simplifies such transactions, as customers are billed di-

rect costs plus the regular percentage of overhead expense.

Generally speaking, each appliance or article of merchandise sold, should bear its proportion of the total overhead expense, excepting possibly, the two extremes in prices. For example, in establishing prices on mantles and chimneys, it may be found advisable to add more than the actual overhead as there are certain fixed expenses in handling these items which are not proportionate to the small amount involved. On the other hand, in establishing the price for a large house heating or industrial appliance, it may be found inadvisable to add the full overhead, the conditions being just opposite to those just cited. However, if this is contemplated the calculation of the total overhead should take such action into consideration, as would also any loss anticipated to accrue from appliances which are to be sold as leaders or for pioneering purposes or at reduced special sales prices.

When appliances are removed for any reason other than non-payment, the difference between their value as credited to stock and the amounts credited the customers therefor must be considered an overhead expense to be absorbed by all other appliance prices. All of this is necessary as the total average percentage of overhead expense is calculated by finding what percent of the total gross sales the total overhead expense represents.

Thorough and painstaking steps to arrive at a reliable overhead percent, based on past performance and not on guesswork, are imperative to prevent the possibility that in spite of all its best efforts and expectations of profit the sales department may meet with disappointment just because its overhead costs were not scientifically established.

Who Wants Our Motion-Picture Film?

Several prints of our one reel motion-picture film entitled "The Spirit of Service" have been returned to headquarters after making the rounds of many cities and states. Several hundred thousand people have seen the film; managers of gas plants have had practically no trouble in getting their local theater managers to exhibit the picture, and altogether the results have been very pleasing, indeed, with comment on the film generally favorable.

Now is the time for companies to order a print and secure prompt delivery. We will make a loan of the picture for a period of two weeks or longer, if necessary, and the only cost connected with its use is the payment of postage.

Let your employees see "The Spirit of Service" if you do not care to exhibit it publicly. Or show it before your local clubs, church meetings, Chamber of Commerce and women's organizations.

With the Committees

Consumers Accounting Committee

At a well attended meeting of the Consumers Accounting Committee held at Association Headquarters March 28, the following action was taken in preparation for the Committee's report.

It was decided to extend the scope of the Committee's investigation of consumers accounting systems to include all operations affecting the the consumer from the time his application is taken until the bill is collected.

Consideration of accounting for merchandise sales and sundry charges will also be included so that the Committee can report as to the general practice in this work, and also to enable companies who carry such accounts in conjunction with their gas ledger accounts to report more intelligently on their consumers accounting system.

A completely revised questionnaire was drawn up which will be forwarded to member companies in order to secure necessary data for the Committee's report. In addition each member of the Committee will submit a report on the systems of consumers accounting in his company prepared in much greater detail than is called for in the general questionnaire. As the membership of the Committee includes representatives of companies embracing nearly all types of consumers accounting systems in utility practice, the information secured from this source will enable the Committee to include in their report a description of the essential details of each system and the actual improvement in operation secured through innovations that may have been incorporated.

From the information secured through general distribution of the questionnaires to member companies the Committee will be able to report:

(a) The general practice as to merchandise accounting and billing of merchandise charges on gas bills.

(b) Extent to which various types of ledgers are used at present.

(c) Extent to which machines are used for bookkeeping and billing purposes.

(d) Practice as to continuous reading and continuous billing.

(e) Number of employees required to handle the work so far as it may prove to be comparable, average weekly hours of labor, etc.

(f) General practice as to collection of bills.

It is hoped through a careful analysis of all data submitted to reduce the various systems to as nearly a comparable basis as possible and to devote an entire session at the Convention to a discussion of their relative advantages. To secure complete and prompt return of the questionnaire, therefore, is most important to the Committee's work. If you are in charge of the consumers accounting in your company, and have not yet received your copy of the questionnaire, write the Secretary at Association Headquarters and a duplicate copy will be forwarded you.

ADVERTISING SECTION

A. A. HIGGINS, Chairman — B. J. MULLANEY, Vice-Chairman

CHARLES W. PERSON, Secretary

MANAGING COMMITTEE—1922

At Large

BENEDICT, C. M., Des Moines, Ia.
BENNETT, J. M., Philadelphia, Pa.
HANLAN, J. P., Newark, N. J.
HUMM, A. W., New York City, N. Y.
INGLE, J. P., Haverhill, Mass.
MURPIT, W. G., Newtown, Pa.
NEWTON, F. A., Jackson, Michigan.
POTTER, CLYDE H., Los Angeles, Cal.
WELSH, W. J., Stapleton, N. Y.
WISKE, P. B., Brooklyn, N. Y.

Representing Affiliated Societies

ALLEN, GEO. W., Toronto, Can. (Canadian)
BURNS, J. J., St. Louis, Mo. (Missouri)
CHAPIN, C. H. B., New York, N. Y. (Empire State Gas & Electric Association)
FRANKLIN, S. J., Millville, N. J. (New Jersey)
FUGATE, FRANK, Detroit, Mich. (Michigan)
GOULD, WM., Boston, Mass. (N. E. Gas Eng.)
HARTOG, JOHN H., Portland, Ore. (Pacific Coast)
JASPERSON, R. O., Chicago, Ill. (Wisconsin)
LESTER, F. M., Chicago, Ill. (Illinois)
ENGLISH, A. L., Council Bluffs, Ia. (Iowa District)
MULHOLLAND, S. E., Fort Wayne, Ind. (Indiana)
ROLSTON, R. J., Philadelphia, Pa. (Pennsylvania)
TILLERY, P. A., Raleigh, N. C. (Southern)

Some Advertising Hints

JOHN H. HARTOG, Portland Gas & Coke Company, Portland, Oregon

TO be effective, advertising should be brief. We all remember the long-winded appeals inserted in the daily papers by certain corporations when they were under fire. Their lengthy explanations were probably gotten up with the minutest care and the most exhaustive consideration, but who besides the proofreader read them? And at the very same time, the short, snappy, few-word epigrams used by the soap-man, or the laxative distributor, hit you between the eyes the moment you opened your newspaper.

You can tell a man that he needs a biscuit so often that he finally believes it and buys a package. He did not need them at all. Ten to one he was overfed. But the constant appeal got him at last.

There was a day when the sign "Cook With Gas" pursued one everywhere, and now everybody cooks with gas if it is available, with the exception of a few old fogies whose idiosyncrasy only proves the rule.

We are now, however, living in the day when "Heat With Gas" is the slogan and eventually the wood and coal dealer will be coming to the gas office for a job.

But what of the chimney-sweeps? What is to become of them? Like bartenders, they don't know much of any other trade. But the law of the survival of the fittest is relentless and anyone who enjoys a real good smoke, can put it in his pipe. Chimney-sweeps and wood-sawyers will be obsolete titles some day and that right soon.

It is amazing how often intelligent newspaper-readers miss their paper. We needn't enter into the reasons, but it is an actual fact that, somehow or other, we are living in such a busy age that we often forget to say our prayers or peruse our morning paper or both.

Therefore a half-page once a week or a quarter-page twice a week is by no means as much of a result-getter as the same amount of space divided over the seven days of the week. The big advertisement may appear the very day that your prospect is leaving home early or just returning from an outing—and your money is wasted as far as he is concerned. But by advertising daily you are bound to catch him *some* days of the week.

The principal thing for a gas company to impress upon the public is that they sell only the best. Don't ever sell an appliance just to cater to a depraved taste for cheap trash. Let the other man do that if he wants to. But the gas company should be like Caesar's wife. It will take time to educate a hundred million people that the gas company cannot afford to sell inferior appliances.

To us the reasons are patent, but the problem is a difficult one. Only by convincing the sales people of this fact and by continually instilling it into the public mind can one gain that prestige. But once gained it is worth all it cost to secure.

Just think a moment. If you want a silk hat, a real swell tie, a pair of full-dress shoes, a tip-top meal or a good auto, where do you go? Do you visit some second-hand shop to see how cheap you can get it? Do you patronize a place you never heard of? No, you make a bee line for the place where you *know* you are going to get the best. The same standard can be established for gas appliances and the public made to feel that if they really want a reliable article they are always safe at the gas company. It will help your sales, increase your turn-over and profit and reduce your tribulations.

Small companies may not be able to employ an advertising man, but those who are big enough certainly should. There seems to be an idea in most gas companies that when they need an advertising man they should promote someone from the ranks, either "because he has been faithful for so many years" or "because he knows the gas business." Both are mistakes that no manager who understands the psychology of advertising is apt to make.

You can take a naturally-gifted advertiser and teach him all he needs to know about gas in a short time, but you might coax and teach and criticise a gas man for a lifetime and never make an advertiser out of him.

The public is not interested so much in CO_2 as in p. d. q. One should remember this and omit technical phrases when addressing the layman. Talk to him in his language.

Don't expect to get advertising sense out of books. One famous professor who wrote an exhaustive volume on the psychology of advertising reaches conclusions which in practice are absolutely wrong. And oh! the pains he took to reach those conclusions! Just to mention one of them: he "discovered" that the upper right hand corner of the page is the desideratum to which every advertiser should direct his efforts. It goes without saying that a little farther "west" and perhaps a little farther "south" is a far more effective location than way up in the "northeast" corner if one can get alongside or underneath of reading matter.

Moral: Don't ask a Professor How to Advertise.

Here and There with the Section

HAVE you received proof of the fourth series of Chat advertisements? Orders are coming in fast for them and many companies pronounce them to be the best set issued so far. We have proofs of a total of 48 Chat ads. for company members who request them.

J. P. Ingle of Haverhill, Mass., whose article "Seeing Ourselves As Others See Us" in the March issue of the Monthly has caused widespread comment, has published an eight-page pamphlet for his customers entitled, "Things You Want To Know About Gas Service."

Here is the way one company is taking advantage of the coal strike, as set forth in its newspaper advertising: "In anticipation of this coal strike, we have stocked our coal and coke bins to their capacity and we believe that we will be able to take care of all demands for gas that may be made upon us. In fact, we invite any one who may be in need of gas on account of their inability to obtain coal for heating to call on us and we will supply their demands to the limit of our ability."

Several of our large banking institutions are not only pushing the sale of utility securities but are spending sizeable sums in national magazine advertising to engender confidence in the present management of utility properties and to bring about an understanding of the fundamental character of utility service. The National Bank of Commerce says in the Saturday Evening Post; "Good profits mean good service and prosperity —poor profits presage unemployment, hard times and business mortality. Our progress towards better times depends upon the general acceptance of the truism that business is worthy of its hire. To deny reasonable earnings to industries, railroads or public service corporations is to deny their usefulness or right to existence."

"Every one today is tired, hurried and troubled with cares," says Roger W. Babson. "The one thing for which we all hunger is hospitality. We naturally gravitate to the place we can get it. The railroads, public utilities and other corporations must get this new point of view if they are to survive. When they do fall in line they will not only survive but will be immensely profitable."

In soliciting public confidence in our business, let us drop the use of words that tend to breed suspicion. For example, let us get away from the bugbear "artificial gas" and call it "manufactured gas." Instead of "consumer" let us write and talk "customer." And by all means let us substitute the word "company" for "corporation."

The Cleveland Leader in an editorial says: "Gas has not been put out of use for lighting, nor has the oil lamp been banished. Very decidedly the opposite is true. The use of gas and oil goes on in hardly diminished extent. Gas was virtually added to the former consumption of oil, taking the United States as a whole, and electricity was added to gas in like manner. Millions of dwellings and stores replaced gas with electricity, but other millions gladly began the use of gas to supplant oil. And meanwhile oil was driving out candles and lighting many dark places which had never had a quarter of the light they needed. The world is growing lighter and brighter every day."

The Washtenaw gas company's plant at Ann Arbor, Michigan, is illustrated and described in a four-page pamphlet recently issued by the Michigan Committee on Public Utility Information. The title of the pamphlet is "Where Your Gas Comes From." This is a fine example of educational publicity along popular lines.

The Boston company continues to issue its attractive "Gas Talks" to its customers. These talks are printed on one side of a sheet of good quality paper with an illustration at the top and are inexpensive and effective. Charles Otten, Jr., of Plymouth, Mass., is also publishing a four-page "Gas Service Messenger" for the enlightenment of his customers. Another attractive little pamphlet is issued by the Utah Gas and Coke Company, of Salt Lake City. Its title is "The Meter Reader." We shall be glad to loan samples of these publications to anyone who is interested.

In the first issue of "Service News," an employee house organ issued by the Citizens' Gas Light Company of Quincy, Mass., President William B. Nichols explains one purpose of the publication in the following manner. "The result that I want to obtain is this," he writes: "That every person associated with me in this company shall be able to answer, intelligently, any question by a customer or prospective customer pertaining to the manufacture, distribution, sale and use of gas, and all matters concerning the general policy of the company in relation to application for service, deposits, kind of meter to be used and why it costs more to distribute and sell gas in Quincy than it does in Boston. On the face of it, this appears to be a large contract but I don't for one minute think everyone is going to register 100 per cent right off the bat; it is going to take time and I assure you the subject matter will be administered in small doses and free from technical description.

"Now while we are trying to get a thorough understanding of the business and policies of the company, I want every employee to get this first policy in his or her mind: If you are asked a question by anyone pertaining to our business that you know you are not able to answer correctly or have the slightest doubt about, say so, and make it your business to find out and then take time to go back to the enquirer and give a correct answer. An incorrect answer or one that is not easily understood may inadvertently cause very great harm in this very matter of public relations. Therefore, don't be afraid or ashamed to say you don't know. Say you will find out and then make that your business. If you want information come to Mr. Quinn or to me. We will gladly answer your questions. You can also help us by bringing questions to us."

An ambitious little booklet entitled, "When It's Your Move" has just been received from the Peoples Gas Light and Coke Company of Chicago. The Booklet deals with the moving season in Chicago—April and May—and explains in an interesting manner how the thousands of turn-on orders received in these two busy months are taken care of by the company without inconvenience to the public.

A full-page illustrated article in the Portland, Oregon, Sunday Journal describes the plant of the Portland Gas and Coke Company and the process of oil-gas manufacture. In the course of the

article the statement is made that at the present time there are 8,000 homes of the city being heated partly or entirely with gas.

Philip H. Gadsden is chairman of a committee to study and report on the subject of trade associations, appointed by the Chamber of Commerce of the United States.

Stating that repetition means reputation, an authority on advertising gives the following advice for those engaged in serving the public: "The public must be told and retold about your ability to serve them. And each time the message must be delivered exactly as if it had never before been mentioned. On this concrete foundation of facts all successful publicity in planned. By the grace of the printing press, the message is given visibility, and an attractiveness that appeals to the eye. But the most favorable impressions gradually fade unless they are revived by the well-timed operation of the 'repeater.'"

Every company member should have a supply of our good-will advertisements in stock, either in electrotype or matrix form, ready for immediate use in newspapers. All advertisements issued to date have been gathered together in booklet form and a copy issued to our members. It is very easy to order from this booklet those advertisements which meet local requirements best and a supply of them should be kept on hand against the day when they will be needed, since we cannot carry a complete stock of them ourselves.

Recent articles issued to the newspapers have been used with more generosity than formerly, which leads us to believe that the public relations situation is greatly improved in all parts of the country. Favorable editorials are now the rule rather than the exception.

Meet Bill Jones

The following article from the Syracuse, N. Y., Journal, tells how the "Fix It" idea has been put into operation by the Syracuse Lighting Company. There are 12 "Fix It" or Bill Joneses in the city and each has his own district.—EDITOR'S NOTE.

If you are among the 55,000 or 60,000 domestic consumers of gas and electricity in Syracuse, meet Bill Jones, provided an acquaintance has not already been established.

Bill Jones is a handy man to have around—a friend in need—if anything goes wrong with the supply of gas or electricity at your home—if a fuse burns out, the gas range isn't functioning properly, gas is leaking, the electric flatiron needs fixing or you have a notion that the gas or electric meter is "off" in its action.

Bill Jones can be depended upon to be on hand at your home promptly if any troubles of the kind mentioned occur. All you have to do is to telephone to the Syracuse Lighting Company, Warren 2200.

Incidentally, while his main object in life is not salesmanship, Bill Jones is prepared to supply your wants in the

matter of incandescent lamps, fuses, gas mantels, flatiron cords, etc., when he calls at your home, at nominal prices.

His job is, essentially, to eliminate trouble and promote satisfaction and comfort in every Syracuse home where gas or electricity is used.

In brief, he is the "Fix It" man for the 55,000 or 60,000 domestic users of gas and electricity in this city. He specializes in efficiency and promptness.

He installs and removes meters, and when he does repair work chargeable to the consumer his charges are on a cost basis only—cost of time, transportation and materials.

Bill Jones is an employee of the Syracuse Lighting Company, trained to do a lot of things which combine service which has heretofore been scattered.

But forget the Syracuse Lighting Company. Just look to Bill Jones.

It will be easy to get in touch with him for he is everywhere present. In fact, there are 12 Bill Joneses in the city, each having his own district.

Bill Jones drives a light motor truck carrying tools, equipment and supplies. He confines his activities to his own particular district, calls up the Lighting Company by 'phone at intervals of one and a half hours during the day for orders, and therefore, is easily available if you want him.

After becoming acquainted with Bill Jones—the Bill Jones of the residential district in which you live—the Syracuse Lighting Company should mean little or nothing to you so far as gas or electrical repairs, replacements, changes or fixture adjustments are concerned.

Bill Jones, representing personal service and having all the necessary resources at his command, is bound to be the best known man in the Syracuse Lighting Company's organization.

Twelve men and twelve automobiles constitute the composite creature "Bill Jones." The illustration above shows three men with their machines completely equipped for duty in their respective districts.

Col. Good and Neighbors own this Big Company

COLONEL GOOD and Citizen Thrifty—together with fifty thousand other people, mostly Californians—own the securities of the P. G. and E.

This information may astonish some who have imagined that public utility concerns were owned by caged-in, austere-looking plutocrats.

But genial Colonel Good, the kindly, sympathetic old friend of the family—who dares to call him a cold and calculating person? Merchant Square and Judge Right—they are your neighbors. No more honorable, fair-minded fellows ever lived. Yet they are also partners in this big concern.

Some way the whole thing looks different, doesn't it, when one realizes that the millions of dollars invested in this huge Company are only the accumulated small sums of individuals who have clubbed together to build an enterprise so needed for the industrial advancement of the state?

This "public partnership" arrangement is a source of pride with the officials of this Company.

The Pacific Gas and Electric Company is the property of thousands of people. And everyone is invited to take shares in it.

PACIFIC GAS AND ELECTRIC COMPANY

P • G • and E •

"PACIFIC SERVICE"

P-05-2 In

The Mightiest Servant *in California*

PICTURE IN YOUR MIND a strong, tireless servant—one ever alert—one that constantly serves, day and night, over 1,700,000 people.

Think of a servant—so domesticated that it warms, lights and makes comfortable the homes of the land—so vigorously powerful that it whirls the massive wheels of factories and hauls trains at breakneck speed.

The Pacific Gas and Electric Company is such a servant. Its service lightens the burdens of housewives. It enables the farmers to take advantage of labor-and time-saving devices. Industries rely upon it for power, light, and fuel.

Service is the only thing this Company has to sell, a service so *great—important—necessary* that confusion, disaster and even loss of life would result if it were not constantly maintained.

Whom the P. G. and E. Serves

Gas for heating and lighting purposes is furnished to over 297,270 consumers by this Company.

More than 283,062 customers depend upon it to provide them with electricity for light and power.

Water is supplied to over 16,162 patrons, and 475 customers purchase steam from this concern.

Transportation is furnished to thousands of people each day by the street cars whose propelling force is supplied by this Company.

Pacific Gas and Electric Company

PACIFIC GAS AND ELECTRIC COMPANY — PACIFIC COURTEOUS CONTINUOUS SERVICE

P·G·and E·

"PACIFIC SERVICE"

P-05:2-1 In

MANUFACTURERS SECTION

JOHN S. DeHART, Jr., Chairman — F. A. LEMKE, Vice-Chairman

C. W. BERGHORN, Jr., Secretary

MANAGING COMMITTEE—1922

At Large

BRILL, A. P., Pittsburgh, Pa.
CLOW, K. S., Chicago, Ill.
COLLINS, D. J., Philadelphia, Pa.
CRANE, WM. M., New York, N. Y.
DEHART, JR., JOHN S., Newark, N. J.
DICKEY, C. H., New York, N. Y.
FERRIS, E. J., New York, N. Y.
GREENE, J. J., New York, N. Y.
GRIBBEL, W. GRIFFIN, Philadelphia, Pa.
KNAPP, F. H., Pittsburgh, Pa.
KOPPER, WM. B., Brooklyn, N. Y.
LEMKE, F. A., Kalamazoo, Mich.
McDONALD, DONALD, New York, N. Y.
ROPER, GEORGE D., Rockford, Ill.
SHERWOOD, J. M., New York, N. Y.
STITES, TOWNSEND, Gloucester, N. J.

Affiliated Representatives

GIBSON, W. R., Toronto, Can. (Canadian)
MILLER, THOMAS D., Detroit, Mich. (Illinois)
WESTON, J. A., Lansing, Mich. (Indiana)
ROPER, GEORGE D., Rockford, Ill. (Iowa Dist.)
SCHALL, H. D., Detroit, Mich. (Michigan)
KELSEY, L. D., Brookfield, Mo. (Missouri)
NORTON, ARTHUR E., Boston, Mass. (N. E. Gas Eng.)
LONG, H. J., New Brunswick, N. J. (New Jersey)
EGLESTON, G. P., San Francisco, Calif. (Pacific Coast)
BARTLETT, C. E., Philadelphia, Pa. (Pennsylvania)
SEIDENGLANZ, C. H., Dallas, Tex. (So. Central)
SPARKS, F. F., Chattanooga, Tenn. (Southern)
McCULLOUGH, CHARLES, Milwaukee, Wisc. (Wisconsin)

CHAIRMEN OF SECTION COMMITTEES ORGANIZED TO DATE

Exhibition—JOHN S. DEHART, JR., Newark, N. J.
Nominating—GEORGE D. ROPER, Rockford, Ill.
Division of Accessories Manufacturers—J. M. SHERWOOD, New York, N. Y.
Division of Apparatus and Works Manufacturers—D. J. COLLINS, Philadelphia, Pa.
Division of Gas Range Manufacturers—WM. M. CRANE, New York, N. Y.
Division of Heating Appliance Manufacturers—K. S. CLOW, Chicago, Ill.
Division of Industrial Appliance Manufacturers—WM. B. KOPPER, Brooklyn, N. Y.
Division of Lighting Appliance Manufacturers—TOWNSEND STITES, Gloucester, N. J.
Division of Meter Manufacturers—DONALD McDONALD, New York, N. Y.
Division of Office Labor Saving Devices Manufacturers—E. J. FERRIS, New York, N. Y.
Division of Water Heater Manufacturers—A. P. BRILL, Pittsburgh, Pa.
Division of Supply Manufacturers—J. J. GREENE, New York, N. Y.

Merchandising Run Amuck!

THE American Gas Association has, among many of its other active committees, one on Standard Gas Appliance Specifications. This committee's endeavor has been to formulate specifications and requirements for the manufacture of gas appliances that will insure the customers of the gas industry the best possible service. Its work also has been of great assistance to these manufacturers in standardizing their product and in protecting them, in a sense, in their conscientious endeavor to give the industry and the public the best product possible. And the manufacturers have co-operated to the fullest extent in this work.

In past years, not so very long ago at that, this was not the case. There was a woeful lack of proper thought given to the design of appliances—a woeful lack of consideration of such items as efficiency, useful life, convenience, etc., and even safety. Also there was a countless multitude of varying designs, parts and accessories. In plain words, gas appliances were a haphazard, hit-or-miss proposition—a deplorable state both for the gas companies and the companies' customers. These are the facts.

But, do not too hastily place the blame for these conditions. Some can be placed directly up to the manufacturers, but by far the greater portion must be charged

against the gas companies themselves. In far too many instances it was a case of purchasing appliances with but one consideration—the price. Get the appliance out on the district to burn the gas—get the appliance that will be most easily sold to the public (in most cases the cheapest) irrespective of any consideration of whether it was the best, whether it was the one that would give the most economical service to the customer, irrespective of whether it would be the most economical appliance for the gas company to maintain. Can you seriously blame the manufacturers under these conditions for supplying only what the gas companies demanded? Hardly. It was their business to sell their product and if that was the class of appliance demanded, there was hardly anything else to do but meet this demand. It was a plain business proposition for them. We know that many of them did not approve, but their hands were tied.

Then came an awakening. In 1911 the National Commercial Gas Association formed a Committee on Gas Range Specifications and in 1912 there was a report submitted to the convention. Ever since then this work has been carried on and enlarged to cover all gas appliances, until in 1920 the American Gas Association published a full and comprehensive set of gas range specifications which were adopted by the Association. There were other specifications but as this article deals primarily with a situation applying to ranges, we will confine our attention to these specifications.

But adoption of a set of specifications is not the last word, even when they are of such immeasurable benefit to the manufacturers, the gas industry and their customers. It takes more than adoption—it takes active enforcement to produce the maximum results.

Here we met with clear sailing again. The manufacturers and the gas companies assured their co-operation, their intent to live up to their expressed approval. The time of hit-or-miss range construction had passed—the gas industry had pledged itself to handle the best ranges, the manufacturers had pledged themselves to construct only the best ranges, both were firmly agreed to ever seek for additional improvements, for increased efficiency, for increased "class," for the best service.

And there was evidence, concrete evidence, of good faith. Some manufacturers began at once to tag their ranges with the Association's official mark of standard construction—"Constructed in Strict Compliance with Specifications." All should have done so. Some gas companies stated their policy in black and white as witnessed by the following quotation from a letter sent to all range manufacturers by one large company:

"Please note that this company has adopted the Standard Gas Range Specifications of the American Gas Association as its standard. In future no gas ranges will be purchased that do not conform to these specifications.

"The department whose duty it is to investigate gas appliances for the sales purposes of this company, will not consider any gas range until a statement is supplied, certifying that the gas range, to be investigated, conforms to the A. G. A. Standard Gas Range Specifications.

"The manufacturers now supplying this company with gas ranges, are required to furnish a statement certifying that each style of range, supplied to this company, conforms to the A. G. A. Standard Gas Range Specifications."

Another company advertised—"Ranges are built up to a standard, not down to a price"—and sold standard specification ranges against strong competion of "skinned" ranges and came out ahead.

Everything was as it should have been. But—unfortunately there was a "but." All range manufacturers did not stamp their ranges and, worse than that, some tried to reduce prices of their product by stripping a range, thus not only placing it without the pale of standard specifications but destroying its proper operation. The blame? Possibly up to the manufacturer, possibly up to the gas companies' demand for lower-priced appliances. But, whoever is to blame, is not the important point—to wit, a step along the road returning to the grievous state of former years—a step directly in retrograde?

But, again the "but." That was not the worst. Manufacturers of ranges have been actually requested by gas companies to reduce the quality of a range in order to make a saving in price. A saving of possibly $1.50! It is unbelieveable, but nevertheless a fact. To save a few cents on a range, the manufacturer has been asked to disregard standard specifications and impair the working qualities of the range.

After many years of conscientious work, are we going to lose all the ground we have gained? It is manifestly unfair to the manufacturers who have co-operated with the Association, it is manifestly unfair to those companies who are supporting the Association in good faith and, worst of all, it is grossly prejudicial to "service"—the one most important thing to both the manufacturers and the gas companies, the most important thing to the whole industry.

If such things are allowed to recur, if they are not checked at once, we will be back where we were ten years ago. We will not only cease to advance, but we will suffer a most serious relapse.

If the Standard Gas Range Specifications are disregarded in such a flagrant manner, what of future moves regarding other gas appliances? There has been too much evidence of the desire to give the customer appliances that are "good enough" instead of striving to supply him with the safest, most economical, most convenient and, yes, best appearing articles, without deliberately destroying the results of any movement in the opposite direction. Every clear-thinking, progressive gas man and manufacturer knows that the higher the grade of appliances sold, the greater the care taken in their construction both in design and material, the more nearly perfect will be the service to the customer. Any thoughtless move that would tend to defeat this should be checked at once.

The time has passed when short-sighted merchandising effort should be allowed to interfere with the quality of the goods sold the gas company's customer.

There has never been a successful man who has not failed somewhere in his experience.

Associations Affiliated with A. G. A.

Canadian Gas Association

Date of Affiliation—Mar. 25, 1919
Pres.—C. S. Bagg, Montreal Light, Heat & Power Co., Montreal, Que.
Sec.-Tr.—G. W. Allen, Consumers' Gas Co., Toronto.
Conv., Hamilton, Ontario, Aug. 24-25, 1922.

Empire State Gas and Electric Association

Date of Affiliation—Nov. 21, 1919
Pres.—E. H. Rosenquest, Bronx Gas & Electric Co., Bronx, N. Y.
Sec.—C. H. B. Chapin, Grand Central Terminal, New York, N. Y.
Conv., Lake Placid, N. Y., Oct. 1922.

Illinois Gas Association

Date of Affiliation—Mar. 19, 1919
Pres.—R. S. Wallace, Central Illinois Light Co., Peoria, Ill.
Sec.-Tr.—R. V. Prather, 305 Illinois Mine Workers Bldg., Springfield, Ill.
Conv., 1922.

Indiana Gas Association

Date of Affiliation—April 24, 1919
Pres.—Morse Dell Plain, No. Indiana Gas & Elec. Co., Hammond, Ind.
Sec.-Tr.—E. J. Burke, Citizens Gas Co., Indianapolis, Ind.
Conv., West Baden Springs Hotel, West Baden, Ind., May 8-9, 1922.

Iowa District Gas Association

Date of Affiliation—May 21, 1919
Pres.—H. B. Maynard, Citizens Gas & Electric Co., Waterloo, Ia.
Sec.-Tr.—H. R. Sterrett, Des Moines Gas Co., Des Moines, Ia.
Conv., 1923.

Michigan Gas Association

Date of Affiliation—Sept. 18, 1919
Pres.—J. A. Brown, Hodenpyl, Hardy & Co., Jackson, Mich.
Sec.-Tr.—A. G. Schroeder, Grand Rapids Gas Light Co., Grand Rapids, Mich.
Conv., 1922.

Missouri Association of Public Utilities

Date of Affiliation—June 18, 1920
Pres.—H. Spoehrer, Union Elec. Lt. & Pr. Co., St. Louis, Mo.
Sec.-Tr.—F. D. Beardslee, 315 N. 12th St., St. Louis, Mo.
Wiley F. Corl, Chmn. Affiliation Com., Missouri Utilities Co., Mexico, Mo.
Conv., Daniel Boone Tavern, Columbia, Mo., May 4-5-6, 1922.

New England Association of Gas Engineers

Date of Affiliation—Feb. 19, 1919
Pres.—V. E. Bird, Connecticut Power Co., New London, Conn.
Sec.-Tr.—J. L. Tudbury, Salem Gas Light Co., Salem, Mass.
Conv., 1923.

Gas Sales Association of New England

Date of Affiliation—Oct. 1, 1919
Gov.—H. J. Pettengill, Jr., Blackstone Valley Gas & Electric Co., Pawtucket, R. I.
Sec.—M. Bernard Webber, 150 Congress St., Boston, Mass.
Annual Meeting, Boston, Mass., May 12, 1922.

New Jersey Gas Association

Date of Affiliation—April 25, 1919
Pres.—H. H. Newman, Public Service Gas Co., Trenton, N. J.
Sec.-Tr.—H. E. Mason, Consolidated Gas Co. of N. J. Long Branch, N. J.
Conv., 1923.

Pacific Coast Gas Association

Date of Affiliation—Sept. 18, 1919
Pres.—Henry Bostwick, Pacific Gas & Electric Co., San Francisco, Cal.
Sec.-Tr.—W. M. Henderson, 812 Howard St., San Francisco, Cal.
Conv., Santa Barbara, Cal., September, 1922.

Pennsylvania Gas Association

Date of Affiliation—April 10, 1919
Pres.—E. L. Smith, Towanda Gas Co., Towanda, Pa.
Sec.-Tr.—Geo. L. Cullen, Harrisburg Gas Co., Harrisburg, Pa.
Conv., 1923.

South Central Gas Association

Date of Affiliation—Oct. 15, 1919
Pres.—Frank L. Weisser, San Antonio Public Service Co., San Antonio, Texas.
Sec.-Tr.—S. J. Ballinger, San Antonio Public Service Co., San Antonio, Texas.
Conv., Hot Springs, Ark., Oct. 10-11-12, 1922.

Southern Gas Association

Date of Affiliation—May 20, 1919
Pres.—L. I. Pollitt, Southern Gas & Electric Corpn., Lexington Bldg., Baltimore, Md.
Sec.-Tr.—G. H. Smith, City Gas Co., Norfolk, Va.
Conv., Greensboro, N. C., May 16-17-18, 1922.

Wisconsin Utilities Association

Pres.—J. P. Pulliam, Wisconsin Public Service Co., Milwaukee, Wis.
Exec.-Sec.—J. N. Cadby, 445 Washington Bldg., Milwaukee, Wis.
Conv., 1923.

COMMERCIAL SECTION

A. P. POST, Chairman — WILLIAM GOULD, Vice-Chairman

LOUIS STOTZ, Secretary

MANAGING COMMITTEE—1922

At Large

BEAL, A. R., Poughkeepsie, N. Y.
CAULEY, F. F., Chicago, Ill.
CLARK, J. C. D., Boston, Mass.
CRANE, WM. M., New York, N. Y.
DAVIES, J. E., Chicago, Ill.
GOULD, WM., Boston, Mass.
LONG, H. J., New Brunswick, N. J.
MACSWEENEY, J. P., Rochester, N. Y.
POST, A. P., Philadelphia, Pa.
REINACH, H. B., New York, N. Y.
RUTLEDGE, F. J., Philadelphia, Pa.
SCHUTT, H. S., Philadelphia, Pa.
SHATTUCK, J. D., Chester, Pa.
SMITH, DORSEY R., Baltimore, Md.

Representing Affiliated Societies

BURKE, E. J., Indianapolis, Ind. (Indiana)
CAMPBELL, E. C., Benton Harbor, Mich. (Michigan)
COBL, WILEY F., Mexico, Mo. (Missouri)
CRAFTS, H. C., Pittsfield, Mass. (N. E. Gas Eng.)
CRANKSHAW, J. WARD, Allentown, Pa. (Pennsylvania)
DOERING, H. A., Mt. Vernon, N. Y. (Empire State)
FISHER, R. E., San Francisco, Cal. (Pacific Coast)
FLAUTT, J. J., New Orleans, La. (South Central)
FORNEY, JAS. A., Charlotte, N. C. (Southern)
GOSS, A. J., Ottumwa, Ia. (Iowa District)
HANLAN, J. P., Newark, N. J. (New Jersey)
JOHNSON, W. B., Toronto, Ont., Canada. (Canadian)
ST. JOHN, JOHN, Madison, Wisc. (Wisconsin)
WALLACE, R. S., Peoria, Ill. (Illinois)

CHAIRMEN OF SECTION COMMITTEES ORGANIZED TO DATE

Contributions to Monthly—Representatives, Affiliated Societies
Industrial Sales—F. F. CAULEY, Chicago, Ill.
Retail Pricing—
Sales Stimulation—WM. GOULD, Boston, Mass.
Educational Pamphlets (Sub.)—J. P. HANLAN, Newark, N. J.
Merchandise Advertising (Sub.)—J. E. DAVIES, Chicago, Ill.
Program—WM. GOULD, Boston, Mass.

Industrial Fuel Engineers and Manufacturers Confer in Chicago

AT an informal conference held in Chicago on March 14 the members of the Industrial Sales Committee and a number of appliance manufacturers discussed ways and means for the development of better and more efficient industrial appliances and for increasing the sale of gas for industrial purposes.

Need for Trained Industrial Sales Engineers

It was the opinion of those present that some steps should be taken to encourage high grade sales engineers to enter the industrial fuel departments of gas companies and that facilities should be provided in the technical schools for such men to secure the necessary training and a better understanding of the application of gas to industrial uses. Accordingly, the Chairman, Mr. F. F. Cauley, appointed a sub-committee consisting of Messrs. McKee, Nutting, Clark and Schuetz to assist him in drafting some definite recommendations which could be transmitted to the General Committee of the Association on Co-operation with Educational Institutions.

In connection with the training of industrial sales engineers it was considered as most important that the technical schools should be provided with necessary industrial gas appliances and equipment and definite suggestions offered to such schools in guiding the students in their studies and research work. It was the experience of most of the men present that such equipment could easily be sold to the schools, and it was equally important that such equipment should be properly installed, with adequate meter capacity, service lines, gas and air supply, etc.

It was also suggested as advisable that a survey should be made of existing industrial installations in technical schools and definite recommendations offered covering necessary equipment to carry on such educational work, and that the teachers in such schools be properly instructed in the operation of the appliances. The sub-committee was requested to bear these suggestions in mind when presenting their recommendations to the Committee on Co-operation with Educational Institutions.

Circularizing Prospects

There was quite a lengthy discussion as to whether it was more advisable for the manufacturers of appliances to circularize prospects from lists furnished by the gas companies rather than have such material mailed direct to these prospects by the gas companies. The consensus of opinion was that it would be more advantageous and bring about better results were the gas company to distribute such literature direct.

Closer Co-operation with Manufacturers

The suggestion was made that gas companies should give greater encouragement to the manufacturers in the development of the latter's appliances and that the practice of gas companies sending their industrial sales engineers to visit the plants of industrial appliance manufacturers should be encouraged. Many expressions were made by men present, that they had found their visits to the plants of manufacturers of greatest benefit as it resulted in a more intimate knowledge of the particular appliances made by the manufacturers and they were able on such visits to secure a great deal of valuable knowledge and data regarding the construction and performance of such appliances.

Assistance of Bureau of Standards

Mr. Berry of the Bureau of Standards stated it was the policy of Mr. Hoover that governmental bureaus do everything possible to assist American business institutions in the solution of their problems, and in line with this policy the Bureau of Standards would co-operate to the fullest extent possible with the gas industry and would welcome from the Committee a written communication recommending such investigations and research work as would be possible under the scope of activities delegated to the bureau.

Proper Presentation of Propositions to Industrial Prospects

Mr. Cauley explained the system followed by his department for obtaining the most minute detail in connection with industrial installations, covering such matters as location of the gas company's mains and capacity to supply the needs of the customer, piping layout of the customer's premises and other necessary information which would enable the industrial engineer to present in a forceful and definite way his proposition to the prospect. He also said it was the practice of his company in every instance to confirm immediately by mail any quotation which was made by his industrial sales engineers.

It was the unanimous opinion that in the matter of sales and quotation letters addressed to prospects these should be short and to the point and better results could be obtained by a series of letters containing sales arguments by mail rather than to attempt to embody the entire proposition in one communication. All those present agreed that the proper presentation of propositions to industrial prospects was a matter which should be most carefully handled and it would be to the interest of gas companies to follow the methods as outlined under this heading.

Helping One Another by Exchange of Ideas, etc.

Mr. Cauley stated it was his intention to have published in each issue of the A. G. A. Monthly definite and concrete examples of industrial processes and installations. This would be accomplished by publishing photographs of particular installations together with sufficient information and data to create an interest in the subject, more complete details of which could be furnished through A. G. A. headquarters from information which would be supplied by the Committee. In order to get this plan well under way, the Chairman called upon members of the Committee who pledged themselves to send in at once material on the subjects indicated below and when these are received they will be published from month to month and given the widest possible distribution:

Mr. Nutting	Recuperation and Regeneration
Mr. Schuetz	Glass bending, core ovens, large water heater installations, drying.
Mr. Reynolds	China kiln firing, house heating, steam boiler installations.
Mr. Rasch	Wholesale bread baking, cocoa bean roasting.
Mr. Stephany	Pottery, glass making.
Mr. Wolf	Rivet heating, automobile engine block testing.
Mr. Tuttle	Case hardening.
Mr. Kallstedt	Barrel drying, asphalt melting, enamelling.

In addition to the above-named subjects, there will be many other industrial operations concerning which the members of the Committee will supply information, all of which will be passed on to our membership.

IN MEMORIAM

Mr. Karl S. Barnes, Vice-President of the Cambridge Gas Light Company, Cambridge, Massachusetts, died at his home on Friday, March 31, 1922.

The Proper Method of Installing All Types of Gas-Fired Water Heating Equipment

N. T. SELLMAN, Service Engineer, A. G. A.

THE object of this article is to show, with simple sketches and notes, what is now considered to be good practice in installing water-heating equipment. A correct installation results in perfect safety, maximum life of equipment, maximum efficiency and minimum maintenance.

As an example showing how gas may be wasted, due to lack of consideration of local conditions, I relate one actual case.

The Gas Company sold a circulating boiler "unconnected" together with a thermostat. Evidently the company considered their part in the transaction complete. But there was a high bill complaint and they made an investigation.

They found that, while the occupancy of the building accounted for not more than 500 gallons of hot water per day, or a gas consumption which should not have exceeded 1000 cubic ft. per day, the actual gas consumption averaged 2500 cubic ft. per day.

It was a four-story bachelor apartment, piped with an extensive circulating system, and the plumber had set the thermostat for 165° F.

The company immediately made a series of experiments, changing the installation and taking a sufficient number of gas meter readings after each change to show the effect on the economy of the installation. What they found was this:

	Average daily consumption in cubic ft.
Original installation (thermostat at 165° F.)	2507
Adjusting thermostat to 140° F.	2130
Cutting out circulating lines	1205
Covering heater, tank and cellar piping	927

This example well shows the advantages of taking careful consideration of seemingly unimportant details. The plumber had done a satisfactory pipe-fitting job, and, except for leaving the installation uncovered, he had done the best he knew how.

It should not be construed that the above remedies are applicable to all cases where excessive consumption is encountered. It may also be due to such items as water leaks, faulty piping, burner adjustment, excessive draft, over-sized equipment, etc.

SMALL CIRCULATING WATER HEATERS — "NON-AUTOMATIC"

The following notes and sketches on the proper method of installing circulating water heaters will help to make these installations more satisfactory and economical. A great many installations of this type of heater have given poor service, not because of the heater but due to the improper method of connecting it to the storage tank. This lack of general good service can be largely overcome if a few simple rules of installation are followed.

(a) Make the circulating pipes between the heater and tank as free from bends and fittings as possible and use the largest practical pipe size (as a rule ¾").

(b) Ream out the ends of all pipe under 1" that is used on circulating lines between tank and heater.

The use of brass pipe on the hot water circulating line from heater to tank is

recommended particularly for high temperature circulation.

(c) Place unions as close to heater as possible on the hot and cold water circulating lines.

(d) Place a sediment blow-off valve or cock at low point under the tank.

(e) The special side tappings as shown in Fig. 1 are so superior to any other arrangement that their use is recommended without qualification. When used without a thermostat the lower tapping "A" should be no less than 6" above the bottom of the tank and the upper tapping "B" no greater than 3" from the top. This arrangement allows free circulation, which results in relatively large volume storage without overheating, it eliminates short circuiting of water through the heater and provides ample sediment storage below the circulating line, thus preventing sediment from getting into the heating element.

The special side tappings can easily be made on any kitchen boiler that is not so provided, by the use of the adjustable

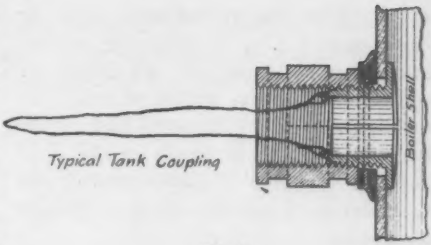


Fig. 2.

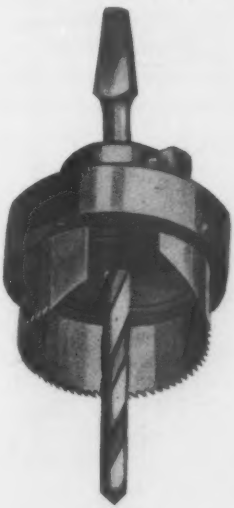


Fig. 3.

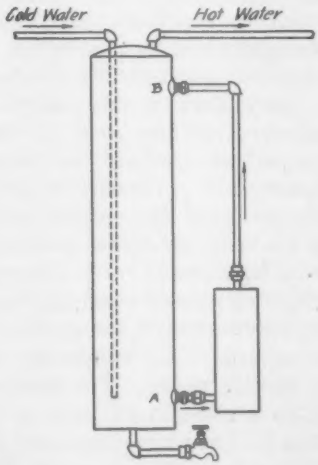


Fig. 1.

tank coupling shown in Fig. 2, and the circular hack saw shown in Fig. 3. The saw is used with any ordinary brace and will cut the desired size hole at any location. The adjustable coupling is then assembled in the hole and made firm. The whole operation is very simple and quickly accomplished.

(f) Fig. 4, shows a heater connected to a tank without any special tappings, merely using the customary top and bottom tappings as supplied on ordinary kitchen tanks. This piping will never give the excellent results obtained from the arrangement shown in Fig. 1. If for

some reason the connections must be made as in Fig. 4, the following precautions must be taken: (1) get bottom of coil at least 6" above bottom of tank; (2) use a non by-pass T at top of tank on the hot water line from heater or else a 1" x ¾" T with the 1" outlet towards the tank and the T placed as close to the tank as possible.

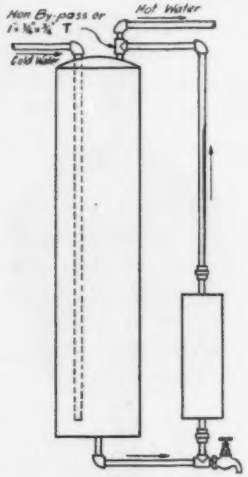


Fig. 4.

(g) Try to get consumer to cover the tank and all the hot water pipe. An asbestos or air cell covering of about 1½" thickness will quickly pay for itself.

(h) If a check valve or reducing valve is on the cold water supply pipe from the street to tank, then an automatic water relief faucet or valve should be installed on the hot water line.

Maintenance:

The burner should at all times be adjusted so that the gas flames are blue with no yellowish tips whatsoever. Be sure that the sharp inner cone of the flame does not touch any of the water-heating surface. Occasionally the burner should be cleaned and any collection of dirt on the heating surface removed if full efficiency is to be maintained. At least once a month a pail of water should be drawn off through the drain cock under the tank.

AUTOMATIC STORAGE WATER HEATERS

Automatic storage water heaters can be divided into the following systems:

1. Assembled heating systems consisting of an insulated tank (usually vertical) heater and thermostat, assembled by the manufacturer ready to install. The heating element is either a circulating heater attached to the tank with a simple run of pipe, or else a heating element located within the tank. The assembled units range in size from about 15 to 70 gallons storage capacity and 30 to 60 gallons per hour heating capacity. These systems are either shipped fully assembled or else knocked down, but with all parts fitted and ready for assembly.

2. Built-up direct circulating systems consisting of a horizontal or vertical storage tank, a circulating heater and thermostat. The heaters for this purpose vary in capacity from the small circulating copper coil heater to large cast iron heating boilers with a capacity up to 1000 gallons per hour. The storage tank capacity can be of any desired amount with the tank horizontal.

3. Built-up indirect steam systems consisting of a horizontal storage tank with steam coils in it, a low pressure steam boiler and thermostat. The boilers and tanks are available in the same capacities as Class 2. The temperature control can work directly on the gas supply or else

on the steam supply from the boiler to the coil within the tank.

In the latter method of control the steam pressure is then automatically maintained by the steam pressure regulator acting on the gas supply.

Installation Information

A. Points Common to All Storage Systems.

The most important item to pay attention to is the proper location of the appliance. As this is an automatic appliance it should be flue-connected and the heater should, therefore, be placed so that a short simple flue is possible. An effective back draft diverter should be placed in the flue near the heater.

The next important thing in determining the location of the heater is the hot water house pipe. Make the connection from the tank outlet to the hot water pipe as direct as possible and favor that portion of the house where most of the fixtures are located by placing heater as nearly under the main riser as possible.

For economy of operation avoid the use of house circulating lines whenever possible. In the average building under four floors in height it is absolutely unnecessary and a tenant would never know whether the water was circulating or not. In many small dwellings there is no circulating return line but, if there is one, it can usually be cut off by closing a valve on the return end in the cellar. The following table shows the maximum length of pipe from the tank to the most remote fixture that can be satisfactorily used without circulation:

Pipe Size	*Linear Feet*
½"	150
¾"	90
1"	50
1¼"	30

The value of insulating all hot surfaces cannot be too strongly emphasized. the following minimum coverings are recommended for various temperatures:

Tank Temperature	*Thickness of Covering*	*Approx. sav. cu. ft. of gas per mo. per sq. ft.*
120° F	1"	85
140° F	1½"	125
160° F	2"	160
180° F	3"	200

If a storage system is not equipped with a pressure relief valve and there is a check valve between the tank and the street service then at least one faucet should be of the pressure relief type.

B. Assembled Systems (Classification No. 1)

There is very little chance of making any mistake in connecting up these systems as there are only three pipe connections to be made, namely, cold water inlet, hot water outlet and gas.

Of these, there could only be a question as to which was the correct cold water or hot water connection as they are both usually located at the top of the vertical storage tank. Most manufacturers label the connections, but should they not be discernable they can be distinguished by the fact that the cold water connection has an internal tube reaching to a point near the bottom of the tank, while the hot water outlet comes directly off the top of the tank.

The thermostats on these systems are usually set by the manufacturer at the factory and should not under any circumstances be tampered with. Should an adjustment prove necessary have it made by the manufacturer's representative. A plumber or gas fitter should not touch a valve unless he is sure that he thoroughly understands its mechanism.

Care should be taken when a heater of this type is connected to the water-back of

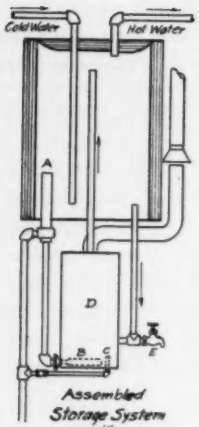


Fig. 5.

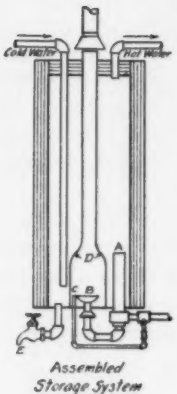


Fig. 6.

a coal stove or furnace, that the thermostat will not be ruined by overheating. This is especially true of tanks below 30 gallons capacity equipped with thermostats that use the expansive force directly for closing the gas valve.

Fig. 5 shows an assembled storage heater with an external heater and Fig. 6 with internal heating surface. Many makes of these heaters have come into wide use throughout the country for domestic purposes. They are very often used as auxiliary heaters in the winter time along with furnace and range water-backs.

Figs. 7 and 8 show how to connect a water-back to a small storage heater both with and without a range boiler. The system shown in Fig. 8 is not as desirable as the reheating system (Fig. 7) for the reason that the water is liable to become overheated in the insulated boiler of the gas-heated unit during cold weather, unless a small pipe is used in the fire pot of the furnace. A gate valve must be placed in the circulating pipe, as indicated, and this valve should be closed whenever the furnace is not in use in order to prevent the hot water from circulating through the water-back and thus wasting gas. Figs. 9 and 10 show the same methods applied to the exterior steam water heaters which are now to a great extent replacing water-backs.

C. Built-up Direct Circulating Systems (Classification No. 2)

The smallest and cheapest form of this system is one using an ordinary vertical

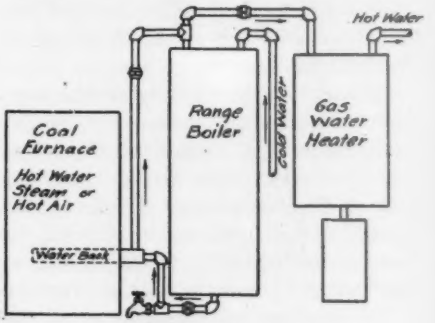


Fig. 7.

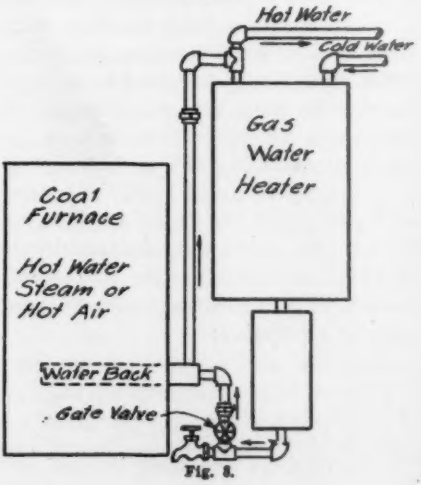


Fig. 8.

kitchen boiler and a circulating heater with a thermostat.

This assembly is shown in Fig. 11 and pictures the most favorable piping for storage at desired temperatures. The

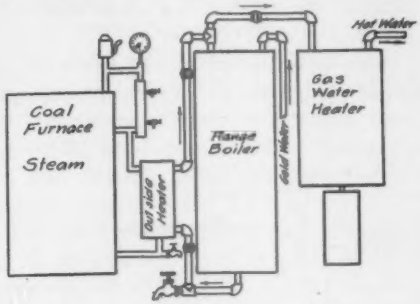


Fig. 9.

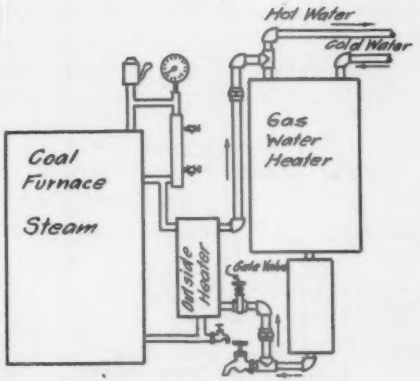
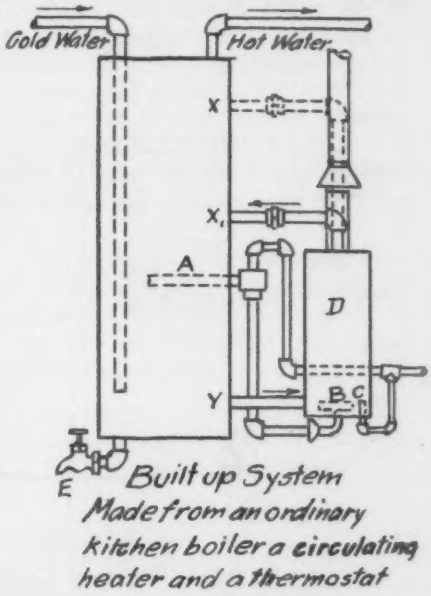


Fig. 10.

lower "X" is located on the side of the tank, the more uniform will be the temperature throughout the tank. The nearer "A" is to "Y" the quicker will the thermostat open the gas valve on the drawing of any water.

It is well to make special mention here of the proper location of the pilot light. First, it should be so placed that its flame does not interfere with the flames of the main burner. Second, it should not be placed in front of any opening in the casing where it will be subjected to drafts or rush of air on the ignition or extinguishing of the burners. Third, the lowest part of the pilot flame should be about 1½" above the burner parts.

The use of standard cast-iron house heating boilers or of multi-coil heaters for storage water heating has made it possible for gas companies to obtain much larger installations than hitherto. Fig. 12 shows a good piping assembly for such a system. The best location for



For quick heating with about 30° F difference between X and Y connect at X

For slow heating with about 10° F difference between X and Y connect at X_1

A Thermostat
B Burner
C Pilot
D Heater
E Drain

Fig. 11.

the thermostat is in the tank at the end where the hot water outlet is located and at half depth of the tank. The heater should be directly under the tank and, in piping, use the largest practical pipe size and only gate valves on the circulating lines.

In the case of the built-up storage systems the thermostat comes as a separate part and is not set for any definite temperature. The following rules can be used as a guide to determine the first "guess" on what will give satisfactory service.

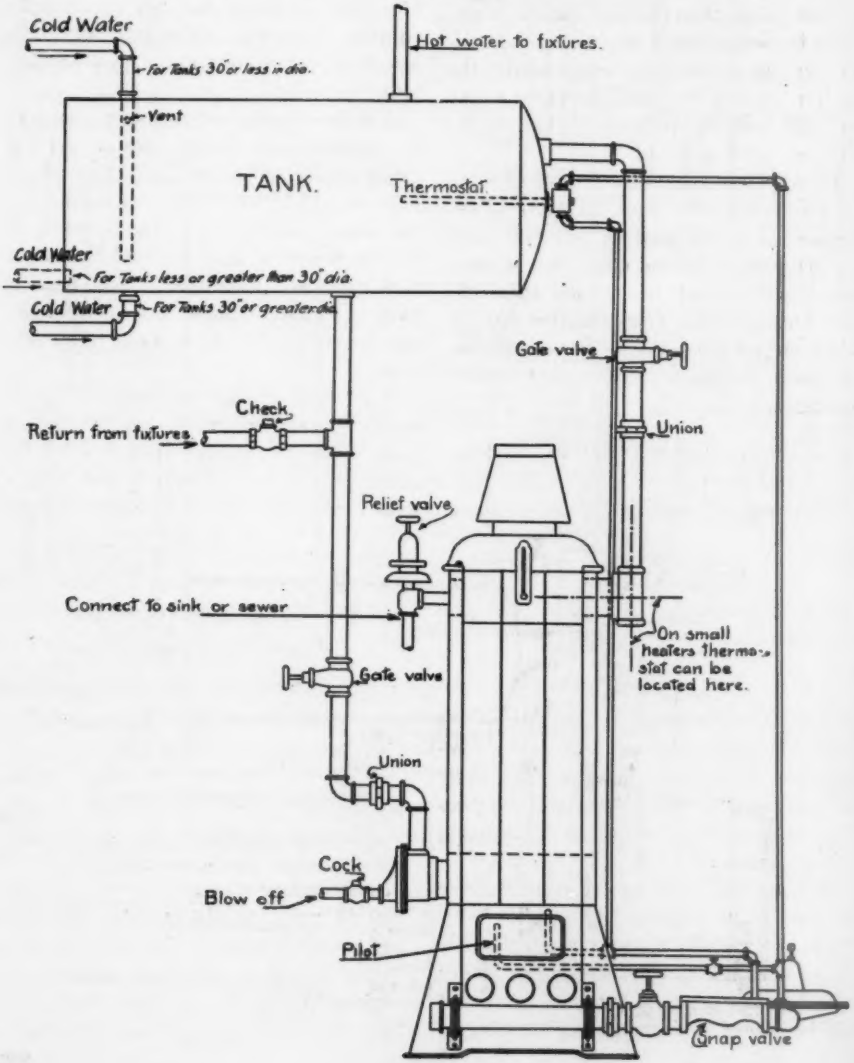


Fig. 12.

	Degrees F.
1. a. Private houses under 4 stories....	130°
b. For each additional floor	5°
2. a. Apartment houses under 6 stories	135°
b. For each additional floor (180° Max)	5°
3. a. Office and lofts under 6 stories ...	125°
b. For each additional 2 floors	5°
4. Hotels	160°-180°
5. Public Baths, gymnasiums, etc.	125°
6. For dishwashing machines	160°

The above temperatures can in many cases be reduced and should be, if possible, as the lower the temperature the greater the economy up to the point where we still deliver sufficiently hot water without causing waste.

Direct circulating heaters should not be used where the water pressure is excessive, as in the case of tall buildings. No set rule should be made, but in general it will be well to consider the Indirect Steam system (classification No. 3) when the service pressure exceeds 70 lbs. or where the building is over 8 stories in height.

D. Built-up Indirect Steam Systems (Classification No. 3)

This system consists of a low pressure automatic gas-fired steam boiler of the house-heating type which supplies steam to coils located in the lower section of a horizontal storage tank or else to a small heater of the instantaneous steam type. The former type of system which is by far the most important is shown in Fig. 13. The instantaneous type is of little value as it requires too large a boiler unless used in conjunction with a storage tank.

The most important factors to consider in steam-heated systems are to get the steam piping and steam coils free of air pockets and to have sufficient head from the steam coil return to the water level of the boiler so that the coil is always well drained. Less than 3 feet head is likely to cause trouble, but in all cases take advantage of all the head room possible.

Fig. 13 shows all the necessary parts to this system and the proper location of each. The thermostat shown is of the steam type, but could equally well be one that worked directly on the gas supply.

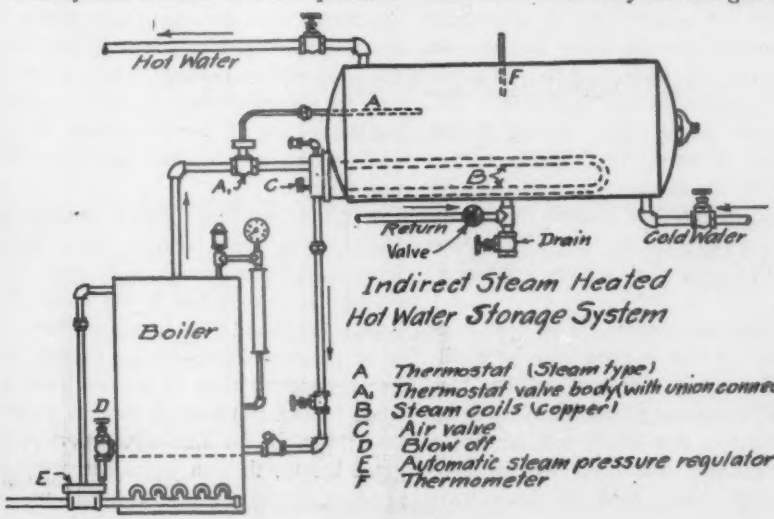


Fig. 13.

If the steam boiler is oversized then the gas-valve type is most efficient, but if the boiler is of the correct size then the steam valve has the advantage that it immediately responds, supplying steam to the coils, when the thermostat opens up.

AUTOMATIC INSTANTANEOUS HEATERS

These heaters differ from all the preceding types in that they do not store up any heated water and must, therefore, heat directly on demand. The points necessary to observe in order to make a good installation are as follows:

1. *Cold Water Supply.* Make sure there is sufficient water pressure to properly operate the water valve. (Figure on ten pounds per square inch pressure drop through the valve when heater is passing the quantity of water for which it is designed—for example, 6 gals. per min. for a No. 6 size). After allowing for this pressure drop there should still be sufficient water head to assure a good flow from the hot water fixtures on the top floor. A quick way to determine this is to measure the water pressure on the top floor and if it is 10 lbs. or greater, then conditions are favorable. The cold water supply pipe should be of equal size or larger than the inlet connection of the heater. A union should be placed in this line nearest the heater and then a valve for shutting off the supply in the event that repairs are necessary.

2. *Flue Connection.* The next consideration is that a good flue be available. To secure the best results it is absolutely necessary that the heater be connected to a flue which will provide a good draft and that it be further protected with some form of back-draft diverter. The flue connection from the heater to the chimney should be as simple as possible and of full size as called for by heater flue collar.

3. *Gas Supply.* The gas supply should be of sufficient size to allow for 60 cubic feet of gas per hour for each gallon per minute rating of heater (600 B.t.u. gas). It has always been considered good practice to install a separate supply line for the automatic heaters direct from meter to the appliance. The meter size should be rated on no greater than a five-tenths pressure drop. A gas service cock should be placed on the gas supply for throttling purposes in case of necessity.

4. *Hot Water Supply:* Hot water connection should be made from the outlet of the heater by a line not larger in size than the outlet connection of the heater. A union should be placed on the hot water line near the heater, and beyond this a check valve for the purpose of preventing "reaction" or flashing of the gas when a cold water faucet is closed.

5. *Condensation:* In some cases where the heater is in continual use, condensation becomes so heavy that it overflows the pan of the heater. This condition may be eliminated by removing the plug in the opening in the pan of the heater and making a permanent drain connection from it.

6. *Location:* The heater should be placed at a point nearest the fixtures from which hot water will most frequently be drawn, but at the same time it must be placed close to a good flue. It is of greater importance to shorten the flue connection than to provide convenience in the running of gas and water lines; for, if the flue connection is of great length, the hot gases necessary to produce proper draft are cooled in the

(Continued on page 320)

A Profitable Account for the Gas Ledger

Showing ice cream cone making by hand operated machines.

Generally used in groups; 7 to 100 per plant. Each machine makes 250 cones per hour. Gas consumption 60 cu. ft. per hour per machine.

Estimating 35 machines for the average plant: $35 \times 250 = 8750$ cones per hour.

Gas consumption figured on 9-hour day would be 472,500 cu. ft. per month.

A Good Wholesale Gas Customer

Showing Ice Cream Cone Making on a Large Scale. Cone making is carried on in nearly every town and city in the country.

This modern machine is heated by gas, makes 7000 cones every hour, operates 20 hours per day. Gas consumption, 800 cu. ft. per hour; based on the above use, would be 400,000 cu. ft. per month per machine.

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Periodical Inspection of Consumers' Gas Meters*

H. VITTINGHOFF, Stone & Webster, Boston, Mass.

THERE exists a very wide difference in opinion as to the proper period during which consumers' meters should stay in service without testing. The majority of companies feel, apparently, that five years is the time which it is safe to leave a meter in operation without bringing it into the shop for inspection, and several state public utility commissions have adopted regulations making it compulsory for companies to adopt such a rule. A great many companies who have accepted this figure as the proper length of time to leave a meter in service adhere to the rule only in theory, and as a matter of fact have kept meters in service for ten years or more without an inspection. Some other companies claim

*Mr. Vittinghoff's report presents such a complete and interesting study of an economic schedule for periodic testing and repairing of gas meters that permission has been obtained from Stone and Webster Journal to reprint it for the information of our members. The author advises that the data upon which his report is based was gathered by Messrs. J. P. Ingle and T. P. Walker of Haverhill, Mass., Rollin Buckminster of Pawtucket, R. I., and Mr. Gilbert of Fall River, Mass. The schedule proposed may not be equally adaptable to all situations especially as existing commission rules in certain states may preclude the adoption of the schedule suggested in the report by companies operating in such states. To make the presentation of this subject complete, there is appended a statement of the rules of state commissions relating to frequency of meter tests and meter accuracy requirements. Any comments which our members care to make on this article, together with any suggestions on this subject, will be appreciated by the Chairman of our Consumers Meters Committee, Mr. Joseph Lucena, who can be addressed care of Association Headquarters, 130 East 15th Street, New York, N. Y.—[EDITOR'S NOTE.]

that meters should be brought into the shop every three years, and others again feel that once every ten years is a sufficiently short period of time. Most companies have accepted the five-year period as a standard, but it must be admitted at once that this schedule has by no means been rigidly adhered to.

The chief reason for the great diversity of opinion in this matter is undoubtedly the fact that little reliable information was available to show whether it was necessary to bring meters in once every five years or if this period should be shortened or could be prolonged. In the absence of such definite information, there was no real incentive to make a strenuous effort to live up to a definite schedule; and furthermore, ever since 1914 the scarcity of skilled meter repair men has become greater and greater, so that even those companies who wished to adhere to the five-year schedule have fallen much behind in their periodical inspections.

In order to clarify the situation as much as possible, an attempt has been made to obtain really reliable data by making a very careful survey of the results of meter inspections actually made in three companies in New England. The study covered the investigation of the meter test and repair records of nearly 7,000 meters, so that the conclusions arrived at, being based on the average of so great a number of meters, should be fairly reliable.

On the basis of certain preliminary figures which were prepared, it was anticipated that the results obtained from the three separate investigations would be sufficiently comparable and mutually supporting to permit us to formulate a schedule of periodic meter tests which might be adopted by all companies.

This expectation was not fully realized. Although in the case of two companies the results of the examination carried on by them checked very closely, the third company submitted figures pertaining to 5-lt. meters which indicated a registration accuracy not nearly as perfect as those which were obtained in the case of the first two companies. However, a further investigation showed that there were perfectly good reasons for this relatively unfavorable showing. This third company has been under our management for a long period of time and the development of the business has been consistently pushed for many years. The other two companies, which came under our management later, have, on the other hand, developed their business only in the last few years, which means, of course, that the number of meters added to their plant during recent times represents a much greater percentage of the total installed than that of the third company. From 1910 to 1920 the first company increased its meters 63 per cent, the second 47 per cent, and the third only 39 per cent. This means, of course, that the last company has a relatively greater proportion of old meters than the first two companies. It is natural to expect that an old meter will not maintain its accuracy as well as one of more recent manufacture. A meter which has had thirty years of service develops a certain amount of lost motion. To some extent an expert repair man can compensate for this, but it is difficult to make such a meter retain its accuracy of registration for any length of time after being placed in service. Meter parts are, of course, made under a system of quantity production, and their nature is such that fine adjustments, such as are possible in assembling an engine or other similar

piece of machinery, cannot be made in the case of a meter. Having a great number of old meters in service, the third company is, therefore, handicapped to a certain extent in maintaining all its meters so that they will register with a high degree of accuracy over a long period of years. Furthermore, this company has bought its supply of meters from a great many different manufacturers, which has not only resulted in the purchasing of some meters which proved inferior in the long run, but must also make it difficult to do the actual repair work in the shop, as the maintenance men have to handle a number of types of meters, all of which vary from each other in some detail of construction.

It is true, of course, that the companies which carried on the study are all located in New England and that the general practice of locating meters on the consumers' premises is very similar. It may well be possible that where meters are set in a haphazard way and are much exposed to the elements, a different schedule of periodical meter inspections should be carried out. However, in the course of this memorandum it will be attempted to set forth certain principles and certain permissible limits of error in meter registration, and it is suggested that before varying to any material extent from the recommendation which will be outlined, that the particular company contemplating such variation should first determine whether or not the condition of their meters, as disclosed by a study of their meter shop test reports, really is so very different from the condition of the meters found in the three New England companies as to make a different scheme desirable.

Such a study should include the investigation of the performance of meters as disclosed by the meter history cards prepared in the repair shop. One hundred cards should be selected, representing 5-lt. meters which have been in service for one year, and the following information should be obtained and noted down in tabular form:

A. Number of D. R. meters.
B. Number of meters stuck.
C. Number of meters registering.
D. Number of meters O. K.
E. Number of meters more than 2 per cent fast or slow.
F. Percentage of D. R. meters.
G. Percentage of stuck meters.
H. Percentage of O. K. meters, which is computed by dividing "D" by "C."
I. Percentage of meters, fast or slow—computed by dividing "E" by "C."
J. Average percentage of error, which is the weighted average error of the O. K. meters and those found 2 per cent or more fast or slow.

After this information has been obtained for the one-year group, the same information should be obtained for one hundred meters which have been in service two years, three years, etc., up to a ten-year period of service, if there are any meters which have been continuously in use without testing for that period of time. In a very small company, the investigation of the performance of a thousand meters may appear to be a very large proportion for test purposes, but it is not felt that reliable information can be had from a less comprehensive investigation. In a larger company, it is to be recommended that this investigation of a thousand 5-lt. meters be supplemented by making an examination of five hundred 3-lt. meters; but in the smaller companies, the thousand meters to be investigated may include both sizes of meters, though care must be taken, of course, in making up the report to segregate these two sizes of meters into separate groups.

In view of the fact that in excess of 95 per cent of the consumers' meters in-

stalled by gas companies are of the 3 and 5-lt. size, the whole discussion will be limited practically to meters of these sizes.

In order to avoid misinterpretation of the figures, it may be well at this time to clearly define the terms which will be used throughout this memorandum. A 3-lt. meter is one which has a normal operating capacity of 70 cft. per hour under a loss in pressure of one-half in. water column. The "rate" of this meter, a purely arbitrary figure, is 18 cft. per hour. The rate of a 5-lt. meter is 30 cft. per hour, and its normal operating capacity under a one-half inch differential is 150 cft. per hour. It is certainly correct to say that our New England companies at least have not purchased any 3-lt. meters since 1911, but before that time this was the meter generally bought by gas companies for use on the premises of domestic consumers. A great many of these meters are still in service, and what is worse, many of the 3-lt. meters are of an obsolete design, such as the so-called "straight side" meters, in which the leather diaphragm touches the sides of the meter and causes roughening at the points of contact, thereby removing the tin coating of the metal. The iron thus exposed rusts, with the result that even if the case is not punctured, the leather diaphragm is rapidly abraded and perforated, bringing about incorrect registration. In recent years our companies owning such straight side meters have purchased undersized diaphragms which would not touch the case, but thereby have merely gotten out of one difficulty into another. The small diaphragm requires a small displacement disk, which in turn reduces the capacity of each stroke of the diaphragm and consequently increases the number of revolutions for each cubic foot of gas passed, thereby straining the mechanism of the meter, which in a great many cases is already overloaded. In many instances 3-lt. meters are installed on premises where a water heater and a gas range are located. The former will consume about 60 cft. per hour, the oven of the gas range about 50 cft., and one or two top burners which may be going, 40 cft. more, making a total load on the meter of 150 cft. per hour or more than 100 per cent in excess of the rated capacity. Such a degree of overworking a meter must, of course, seriously disarrange its mechanism in the long run.

Meters are considered accurate when on test they prove either 2 per cent fast or slow, both on the "rate" and the normal capacity. They are considered non-registering or, as it is technically termed, D. R. meters, when they fail to register at all on the rate test. It must be borne in mind, of course, that a 3-lt. meter, for instance, may not register at all when gas is being passed through at the rate of 18 cft. an hour, because this amount leaks through holes in the diaphragm or through defective valves, but still such a meter would register when gas is being passed at its normal capacity of 70 cft. an hour. A D. R. meter is, therefore, nothing more than one which registers slow to a considerable extent. For this reason it is clear that it is by no means an easy matter to detect D. R. meters by an inspection of the ledger accounts of our customers supplied through such a meter. Usually the tendency to become a D. R. meter is developed slowly over a period of many months, so that it is very difficult to make a comparison month by month without a great deal of time being spent on such investigations by the clerical force. Nevertheless, in a great many cases a system

of ledger inspections intelligently and thoroughly carried out will enable the company to reduce the number of D. R. meters in service in its district.

In regard to 5-lt. meters, the investigation of the meter record cards of the first company showed the following conditions. At the end of a three-year service, the investigation showed that meters of this size tested 94 per cent correct, or in other words, only 6 per cent of the meters tested, after having been in service for three years, showed an error greater than 2 per cent fast or slow. At the end of seven years, only 12 per cent of the meters were found to be in error, but after that the percentage of error rapidly increased until at least 43 per cent at the end of the eleventh year were in error. Apparently, the percentage of meters in error then remained constant, but the meters in service longer than eleven years were so few as to make any conclusions from the figures obtained very likely to be misleading. The results reported by the second company were very similar to the above figures, but in the case of the third company, a greater degree of inaccuracy of registration was noted. In the latter company, at the end of the third year of service, 89 per cent of the meters tested correct, which decreased to 61 per cent, or 39 per cent in error, at the end of seven years. The reason for this has already been noted above.

It is interesting to note that the fast and slow meters counterbalance each other to a great extent. In the case of one of the three companies making the study, all the meters installed averaged about one-half of 1 per cent slow for the first seven years of service and then gradually became fast to the extent of showing an average plus error of about 1 per cent at the end of the eleventh year. The second company showed similar figures, and while the third company did not show this tendency for meters to run fast after having been installed for a long period of years, the average percentage of error, though on the "slow" side, remained very small. These results validate the generally accepted idea that from the point of earnings alone, it is not necessary to adopt any rigid system of periodical meter rotation, but, of course, in fairness to its consumers a company must see to it that the fast meters, which do offset the losses incurred by slow meters, are not allowed to remain in service.

In this 5-lt. size of meter it was also noticed that the D. R.'s were very few in number. Throughout the eleven-year period tested, the percentage of D. R. meters fluctuated between one-half per cent and 2 per cent, averaging about 1 per cent for the first two companies, but increasing to an average of 5 per cent after five years' service in the third company. The probable reason for this unfavorable showing has already been indicated.

It will be interesting to consider the effect on the earnings of the number of D. R. 5-lt. meters which may be in service in any company which has, let us say, ten thousand of such meters in use. If 1 per cent of these meters should be D. R. meters, and the average consumption through a 5-lt. meter is 24,000 cft. per year, the gas which is consumed through these meters at an average rate of $1.30 per thousand feet should bring in a revenue of $3,120. A supplementary investigation showed that D. R. meters register on the average only 50 per cent of the gas passed, so that the loss in revenue will be $1,560. Systematic rotation of meters would enable a company to catch probably one-half of the D. R. meters in serv-

ıce, so that the maximum expenditure which could be made in order to reduce the number of D. R. meters is $780, for if more were spent, such a system would cost more than it would return in increased revenues. Any company which has ten thousand 5-lt. meters installed would, however, have to spend a great deal more than $780 a year to carry through any system of meter rotation which would prove to be effective.

In view of the fact that, as stated above, more than 95 per cent of the meters installed are of the 3 and 5-lt. size, it naturally follows that the number of larger meters whose records were examined was very limited, but such information as was obtained clearly demonstrated that the 10, 20, and 30-lt. meters and those of still larger capacity tend to maintain accuracy of registration even better than the 5-lt. meters. In any event, whatever system of meter rotation relative to these larger meters is adopted, the cost to the company would not be a serious matter. While these meters retain their accuracy of registration on the average for a long period of years, it is also true that the quantity of gas passing through them in some instances is very large, so that if one meter goes wrong, which would not disturb the average figure, the company may still lose considerable income on account of this one meter. It is, therefore, quite necessary to watch carefully on the ledgers the accounts of consumers supplied through these larger meters, and to check up at once any apparent falling off in consumption. If such falling off is noted, the meter may be brought into the shop for test, or its accuracy of registration could be checked up by testing it in place. This can be done very readily by using a portable test meter of the 3-diaphragm type, which is a very accurate device, and placing it in series with the regular consumer's meter and comparing the registration. In making such a test, care should, of course, be taken that the temperatures of the consumer's meter and the test meter have been thoroughly equalized. Before dismissing the subject, it is suggested that it may be well for our companies to make it a general practice to test 20-lt. meters and those of still larger capacity, either in the shop or in place, at least once every two years in order to catch any possibility of material loss in revenue, which it may not be possible to discover from a mere inspection and comparison of the monthly figures on the consumers' ledgers.

When comparing the 3-lt. meters with the 5-lts., an entirely different picture is presented. In this case it should first be noted that there is a more noticeable discrepancy in the figures presented by the three companies supplying the data for the study. In the case of the first company, meters of this size, after a service period of three years, showed 5 per cent of the 3-lt. meters installed to be in error. This percentage of error increased to 26 per cent after seven years, and to 31 per cent after ten years of service.

In the case of the second company, the per cent of meters in error was 30 per cent after three years' service, which rose to 93 per cent at the end of eight years.

The third company supplying data for this study showed a radically different state of affairs. Here the 3-lt. meters showed a percentage of error only slightly greater than that of the 5-lts., and the D. R. 3-lt. meters were also not much more in evidence than those in the 5-lt. class. This remarkable difference caused a further study, which developed the following facts: In the first company, of all the meters in service 38.5 per cent

were 3-lts; in the second company, which showed a very large number of 3-lt. meters to be in error, these meters represented 56 per cent of the total installed; whereas in the third company, where the 3-lt. meters seemed to perform nearly as well as the 5-lt., the former represented only 7.7 per cent of the total number of meters in use.

With the exception of the so-called "straight side" meters referred to before and some badly constructed by certain manufacturers, it is generally conceded that there is nothing inherently wrong with the construction of the 3-lt. meter. If properly used, it should last just as long and register just as accurately as the 5-lt. meter. The great difficulty is that in those companies having a large number of 3-lt. meters in service, the great majority of these meters are very much overloaded. It has been shown above that apparently the greater the percentage of 3-lt. meters, and therefore, the greater the number of meters which may reasonably be assumed to be overloaded, the larger the number of meters found in error. Where, as in the case of the third company, only a limited number of 3-lt. meters are in use, and where care has been taken to place these meters in locations where gas is being used at relatively low rates of consumption, this meter will perform as well as the 5-lt. meter. On the other hand, where the 3-lt. meters represent a very large proportion of the total number of meters in use, it is impossible to restrict them to service at low rates of flow. A great many of them must be overworked, with the result that they are unable to maintain their accuracy of registration over any considerable period of time.

The picture as so far presented shows a very serious state of affairs, and the question most naturally arises whether or not a company would be warranted in replacing all its 3-lt. meters by 5-lts. until not more than about 10 per cent of the total number of meters installed are of the smaller size. It is fair to assume that in almost any community a limited number of 3-lt. meters can be used without overloading.

Before any conclusion can be arrived at as to the proper policy to be adopted by a company having large numbers of 3-lt. meters now in service, and in order to determine whether or not these should be scrapped and replaced by 5-lts., it is necessary to consider carefully whether or not the company is warranted in making such a change by the savings which might ultimately result. In carrying on a study along this line, certain assumptions must be made. First and foremost, the principle must be definitely accepted that it is one of the prime duties of the company to maintain its meters in such a way that they shall all register with a reasonable degree of accuracy. This involves a periodic inspection of the meters, and with the aid of the data gathered by the three companies it was possible to formulate a plan of meter rotation which should insure a reasonable degree of accuracy of registration of all the meters during their period of service. From the figures given before, it is, of course, quite clear that 5-lt. meters can stay in service for a much longer period of time than 3-lt. meters without bringing about a condition where large numbers of meters are registering incorrectly. From this it follows that the money expended for maintenance of a 3-lt. meter over a long period of time must be considerably greater than that expended for the maintenance of 5-lt. meters. There is no material difference in cost of testing or re-

pairing either size of meter, and therefore, it is really only a question of the relative number of 3-lt. and 5-lt. meters which must be handled per year which determines the relative cost of maintenance of these two sizes of meters.

However, if it should be decided to scrap 3-lt. meters and replace them by 5-lts., the company so deciding must face a material capital expenditure to carry out such a plan. If 5-lt. meters are installed to replace 3-lts., the company must spend $10.00 a meter for making such a change, even when taking into account the scrap value of the 3-lt. meters replaced, which probably will not be more than 50 cents per meter. The plan, if carried out, must effect savings sufficiently great to carry the full cost of a 5-lt. meter, since there is no depreciation fund available, for it has been the custom of our companies to take care of the depreciation of meters entirely through operating expenses.

In order to discover what the cost of maintaining 5-lt. and 3-lt. meters really amounts to, it was found necessary to prepare elaborate tabulations of the probable cost of maintaining the meter shop of a hypothetical company which had one hundred 3-lt. and one hundred 5-lt. meters installed. Before it was possible to proceed with this work, it was necessary to make certain assumptions as to the frequency with which 5-lt. meters and 3-lt. meters respectively would have to be brought in for test, the probable results of such a test, and the nature of the repair work which had to be done. The data gathered in connection with the 7,000 meters whose records were examined was used to formulate the following assumptions:

The cost of changing a meter on the consumer's premises, handling it through the shop, and testing it is taken at $2.00 for both 3 and 5-lt. meters, whereas the cost of changing, testing, adjusting, and repairing was assumed on the average to run up to $5.00 per meter.

In the case of 5-lt. meters, the following schedule of rotation is proposed:

Meters are to be brought in for test after seven years' service since they were bought or underwent general repairs.

Of these meters 12½ per cent will probably have to undergo general repairs and are then to be reset for seven years.

Eighty-seven and one-half per cent will probably test correct, and are to be reset for five years more.

Of this last class, when they are brought in after this five-year period has elapsed, 50 per cent will probably prove correct and ought to be reset after twelve years for another five years, the balance to undergo general repairs.

All meters which have been in service for seventeen years since they last underwent general repairs are to undergo general repairs whether they test correct or not, as it is generally agreed that the life of a leather diaphragm cannot safely be put at more than seventeen years.

It may be interesting to note that on this schedule the average period in which meters are in service without undergoing general repairs is 13.6 years.

Applying such a schedule to a company having installed one hundred 5-lt. meters discloses the fact that during a period of thirty-four years, which, it will be noted, is twice the maximum length of time any meter stays in service without general repairs, 520 meters must be handled in the shop. Of these, 215 undergo general repairs, and 305 are tested and reset. The cost of this work during that period of time amounts to $1,685. Applying these figures and expressing them in

terms of number and cost per meter installed, such a company would have to make general repairs on 6.33 per cent per year of its meters installed, and must test 8.97 per cent per year, or, in other words, the meter shop must handle 15.3 per cent of the meters installed each year at a cost of 49.6 cents per meter installed. This figure, of course, pertains only to the handling of meters through the meter shop on account of a schedule of periodic meter rotations which may be adopted, and does not include the meters which have to be handled because of changes in residence of consumers or other causes. All the figures submitted in this memorandum pertain, of course, only to periodic meter tests.

A company having to handle 3-lt. meters is assumed to have adopted the following schedule of rotation:

Meters are to be brought in for test after four years from the time they last underwent general repairs.

Twenty per cent of these will probably have to undergo general repairs and ought then to be reset for another period of four years.

Eighty per cent will probably test correct, and ought to be reset for three years more.

Of this last class, when they are brought in after this period of time has elapsed, 50 per cent will probably prove correct and ought to be reset after seven years for another three years, the balance to undergo general repairs.

All meters in service ten years since they last underwent general repairs are again to be subjected to general repairs. In this case the life of the leather in the diaphragm is not the limiting factor, because it has been well established that the wear and tear on a 3-lt. meter is much greater than that on meters of larger size because they are nearly always overworked. Even in companies having only a limited number of 3-lt. meters in service, it would not be advisable to adopt the 5-lt. rotation schedule because there is much greater likelihood that 3-lt. meters may be overworked than would be the case with 5-lt. meters.

Such a schedule will result in a period of 7.6 years during which the average 3-lt. meter will be in service without general repairs.

Adopting this scheme of rotation of 3-lt. meters, it is found that a company having one hundred 3-lt. meters installed would during a period of twenty-one years have handled through its shop 562 meters, of which 247 would have to undergo general repairs and 315 would have to be tested only. This involves an expenditure of $1,865. Interpreting these figures in terms of percentages, we find that a company having one hundred 3-lt. meters installed would have to make general repairs each year on 11.76 per cent of the meters installed, and in addition, test annually 15 per cent of the meters. It would, therefore, have to handle 26.76 per cent of its meters each year at an annual expenditure of $88.80 or 88.8 cents per meter installed.

These figures clearly show that it costs nearly twice as much to take care of a 3-lt. meter as is involved in the maintenance of a 5-lt.

This, however, is not the only factor in favor of the 5-lt. meter. There must also be considered the fact that there always must be, under the conditions existing in most companies, a great many more D. R. meters in the 3-lt. class than there are in the 5-lt. class, and the fact that there is also a greater tendency for 3-lt. meters to register slow than is to be expected from 5-lt. meters. The effect on the

earnings of these two factors will next be considered.

In the case of 3-lt. meters, it has been shown that during the average period between general repairs of 7.6 years there will have developed at least 20 per cent of D. R. meters. (This, however, is only the case in companies which have so many D. R. meters that the great majority are always overloaded. Where the percentage of 3-lt. meters is less than 10 per cent of the total number of meters installed and where the load is of such a nature that in a great many cases consumers require gas at only a very low rate of flow, this will not necessarily be the case.) In order to make a conservative estimate, it will be assumed that these twenty D. R. meters out of every hundred 3-lt. meters installed can be reduced to 10 per cent by a more careful examination of the ledger accounts. It is, therefore, assumed that only 10 per cent of the meters will be in the D. R. class at the termination of the average period between tests, which, however, still leaves 5 per cent of all 3-lt. meters installed in the D. R. class in service. Assuming that these five meters out of every hundred would each normally account for a consumption of 24,000 cft. per year, it is safe to figure that since a D. R. meter will register on the average 50 per cent slow, the company will stand to lose an income from 60,000 cft. of gas, which, at an average price of $1.30 per thousand, amounts to $78.00 per year, or, in other words, that in the 3-lt. class the D. R. meters increase the cost of operation 78 cents per meter.

In the case of 5-lt. meters, the D. R.'s average 1 per cent and assuming that by careful examination of the ledgers this can be reduced to one-half per cent, the gas lost on account of such D. R. meters amounts to only 6,000 cft. per year, which at an average $1.30 rate amounts to $7.80 or 7.8 cents per meter.

During the period of installation of 3-lt. meters, all those installed which were not D. R. meters—i.e., 95 per cent—average 1.5 per cent slow. In one hundred 3-lt. meters this average percentage of slow registration results in a loss of 1.5 per cent x 95 x an annual consumption of 24,000 cft. or 34,200 ft. at $1.30, equivalent to a loss of $44.40 per year or 44.4 cents per meter installed.

During the period of installation of 5-lt. meters, these average 1 per cent slow in all those installed except D. R. meters, i.e., 99.5 per cent. It, therefore, follows that in one hundred 5-lt. meters installed, the loss from slow registration will amount to 1 per cent x 99.5 x 24,000 or 23,900 cft., which at an average rate of $1.30 results in a lost revenue of $31.00 or 31 cents per meter installed. There have now been developed all the factors needed to show the relative cost of handling 3-lt. and 5-lt. meters, from which can be set up the following comparison of operating costs of these two classes of meters:

	3-Lt.	5-Lt.
Maintenance cost to cover expense involved in making periodic tests and necessary repairs on the basis of rotation schedules set forth above	88.8c	49.6c
Fixed charge of 10 per cent on $10.00, the cost of the 5-lt. meter installed to replace a 3-lt. meter	00.0	100.0c
Lost revenue from D. R. meters	78.0c	7.8c
Loss on account of average slow registration	44.4c	31.0c
Total	211.2c	188.4c
Annual saving effected by substituting a 5-lt. meter for a 3-lt. meter		22.8c

This figure clearly shows that it is advantageous to discard 3-lt. meters and substitute 5-lts. for them. The saving

of 22.8 cents for every meter, it should be pointed out, is a net saving over and above the fixed charges on the capital needed to make the change, and is directly applicable to an increase in the dividends or a decrease in the rates.

There is a further benefit to be derived from making this change which has so far been left entirely out of consideration. It is true, of course, that a 3-lt. meter will pass 150 cft. of gas, but the differential loss in pressure through the meter when this demand is placed upon it is very large. Where the street main pressure is 4 inches or more, this loss is of no consequence, but in the outlying districts of the territory served by a good many gas companies, during certain periods of the day low pressures are quite prevalent, and in such cases the pressure loss through the meter brought about by a high rate of flow so aggravates conditions that the quality of the service given the consumer must be seriously influenced. A gas company is bound to give its customers good service, and furthermore, it is undoubtedly true that if the customer does not have gas available at the time when he wants it, his total consumption will be markedly reduced, with the consequent loss in revenue directly ascribable in such an instance to the use of a 3-lt. meter where a 5-lt. meter is indicated by the demand.

As has been noted previously, very old meters will not hold their accuracy for as long a period of time as those of more recent construction, which, therefore, necessitates that they should be more frequently overhauled to maintain the general accuracy of registration of all the meters. The repairing of old meters is naturally more expensive than that necessary on meters of more recent make and may under certain conditions run up to 60 per cent of the cost of a new meter. The frequent overhauling necessary in connection with these meters seriously burdens the repair shop, the jobbing shop, and the office organization, and these departments could be relieved of considerable work if the very old meters were eliminated from service.

It would seem advisable to make greater efforts to discover from the ledger accounts the D. R. meters in service, and it might prove profitable to detail a clerk to determine periodically whether or not the ledger accounts indicate that any meters apparently in the D. R. class are in service. In the larger companies it might even be wise to have one man devote his time to this work exclusive of any other duties, and in the smaller companies half the time of one man may profitably be expended on this work.

Taking all factors into consideration, it is, therefore, recommended that each of our companies give serious consideration to the adoption of the schedules of meter rotations indicated providing these are compatible with the regulations of the state in which they operate, and providing a study of their meter record cards discloses a condition which is not widely varying from the results of the examination outlined above. It is also recommended that if the financial condition of the company permits, they replace 3-lt. meters with 5-lt. meters until the number of 3-lt. meters installed is not in excess of 10 per cent of the total number of meters installed, and thereby realize material savings in operating expenses. Finally, it is recommended that our companies make it a practice to condemn all meters more than thirty years old.

RULES OF STATE COMMISSIONS RELATING TO FREQUENCY OF METER TESTS.

State	Years
Arizona	3
California	6
Colorado	5
Connecticut	5
District of Columbia	5
*Illinois	7
**Indiana	5
Kansas, natural gas,	5
Maine	5
Missouri	5
Montana	5
Nevada	3
New Hampshire	5
New Jersey	6
New York, First District	6 or 7
North Carolina	5
North Dakota	5
Oregon	5
Pennsylvania	5
Washington	5
West Virginia, natural gas, (for domestic meters)	5
Wisconsin	4

*Period has been increased from 5 to 7 years since Circular No. 32, Fourth Edition, was printed.

**Period has been increased from 3 to 5 years since Circular No. 32, Fourth Edition, was printed.

METER ACCURACY REQUIREMENTS

State	At Installation	Required to Avoid Bill Adjustments
	Percent	Percent
Arizona	±3	±3
California	±1	±2
Colorado	±1	±2
Connecticut	+1 -2	±2
District of Columbia	±2	
Illinois	±1	±2
*Indiana	±1½	±2
Kansas, natural gas	±1	+2
Maine	±2	±3
Maryland	±1	
Massachusetts	±2	
Missouri	±2	
*Montana	±1	±2
Nevada	±2	
New Hampshire	±2	±3
New Jersey	±2	
New York	±2	
North Carolina	±1	±3
North Dakota	±1½	±2
Oregon	±1	+3 -5
Pennsylvania	±2	+2
Washington	±2	
West Virginia, natural gas	±2	±2
Wisconsin	±2	

*Changed since previous edition of Circular No. 32.

Statement of the Ownership, Management, Circulation, etc., Required by the Act of Congress of August 24, 1912,

Of American Gas Association Monthly published Monthly at Brattleboro, Vermont, for April 1, 1922. State of New York. County of New York.

Before me, a Notary Public in and for the State and county aforesaid, personally appeared Louis Stotz, who, having been duly sworn according to law, deposes and says that he is the Business Manager of the American Gas Association Monthly and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 443, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are: Publisher, American Gas Association, Inc., 130 East 15th St., New York. Editor, None. Managing Editor, None. Business Managers, Louis Stotz.

2. That the owners are: (Give names and addresses of individual owners, or, if a corporation, give its name and the names and addresses of stockholders owning or holding 1 per cent or more of the total amount of stock.) American Gas Association, Inc. No stock issued.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: (If there are none, so state) None.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

5. That the average number of copies of each issue of this publication sold or distributed, through the mails or otherwise, to paid subscribers during the six months preceding the date shown above is not required. (This information is required from daily publications only.)

(Signed) LOUIS STOTZ.

Sworn to and subscribed before me this 20th day of March 1922.

[Seal] (Signed) F. C. GORDON.

(My commission expires March 30, 1923.)

Utilization of Compressed Air in Clearing Gas Piping

AT the 1921 meeting in Chicago, J. T. Griffin of the Consolidated Gas and Electric Light and Power Company presented a paper describing the Baltimore practice in the use of compressed air for clearing out services and housepipes which become stopped up with deposits.

So much interest was aroused in this practice and so many inquiries received as to the method of using compressed air that a committee on this subject was appointed in the Technical Section with J. T. Griffin as Chairman.

The chief function of this committee will be to:

(a) Ascertain companies at present using compressed air for clearing gas piping, their experience with its use, necessary training of personnel, precautions to be observed, etc.

(b) To be of service to member gas companies desiring to take up the use of compressed air by supplying full information as to equipment, organization required and such other information as can only be obtained through experience.

To date the committee has ascertained that the following larger gas companies are using compressed air:

United Gas Improvement Co., Philadelphia, Pa.
Public Service Gas Company, Newark, N. J.
Laclede Gas Light Company, St. Louis, Mo.
Providence Gas Company, Providence, R. I.
Washington Gas Company, Washington, D. C.
Consolidated Gas, Electric Light & Power Co., Baltimore, Md.

It is suggested that all member companies who may be troubled with stoppages in services or housepipes get in touch with the Chairman, J. T. Griffin, Consolidated Gas, Electric Light & Power Co., Baltimore, Md., or with any of the companies in the above list. Full information will be gladly furnished as to the use of compressed air and its effectiveness in clearing deposits. Those members who were not supplied with a copy of Mr. Griffin's paper at the Convention will find much information in the reprint of this paper and its discussion in the report of the Technical Section Proceedings, 1921, which are now available.

IN MEMORIAM

Mr. William McDonald, of D. McDonald & Company, Albany, N. Y., died at his home Thursday, April 20, 1922. Mr. McDonald has long been associated with the gas industry and was a past president of the Western Gas Association and a member of many other associations.

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essential chemical nature of the processes.

"This will probably be followed by a discussion in two or three lectures of some recent developments which may tend to produce changes in practice.

"Finally, it is hoped there will be about a dozen lectures on special topics by men prominent in the industry. The topics of these special lectures include coke ovens, vertical retorts, chemical control, evaluation of plants, economics of gas manufacture, heat standards in practice and distribution problems.

"The total number of lectures will be twenty-eight or twenty-nine, given four or five a week for six weeks, beginning July 10th and ending August 18th.

"To give an underlying motive for the work of the course, and possibly to serve in place of an examination, it is planned to set before the class, in the opening lecture, the problem of the design of a gas plant for a small city. In this design the men will not be expected to do draughtsman's work, but rather to outline the solution, giving flow sheet of plant, kind and size of apparatus, costs of installatioin and operation. It is hoped in this way to help the student to realize the bearing of each subject on the general question of gas making. The final report of the student in this case will be made as complete as possible up to the estimated cost of gas in the holder.

"The laboratory work which is scheduled along with the lectures will devote special attention to the testing of coal, gas oil, gas and gas-house products. The object, however, is not so much development of analytical technique, but rather practical instruction in the principles of chemical and physical testing and the development of an appreciation of their uses and limitations. This part of the work will be optional so that men may register for the lectures only, or may combine the lectures and laboratory.

"Men spending full time at the Summer Session will probably be able to carry one other course of lectures if they take both lectures and laboratory in the gas course. If they take only the lectures, they will be able to take two other courses. All lecture courses in the Summer Session run five hours per week."

Professor Morgan has indicated that he will welcome both criticisms and suggestions regarding the above program from members of the Gas Fraternity.

Your Committee suggests that summer courses of this kind offer excellent opportunity for gas companies to recognize meritorious service of their workers by making it possible for a selected number to attend.

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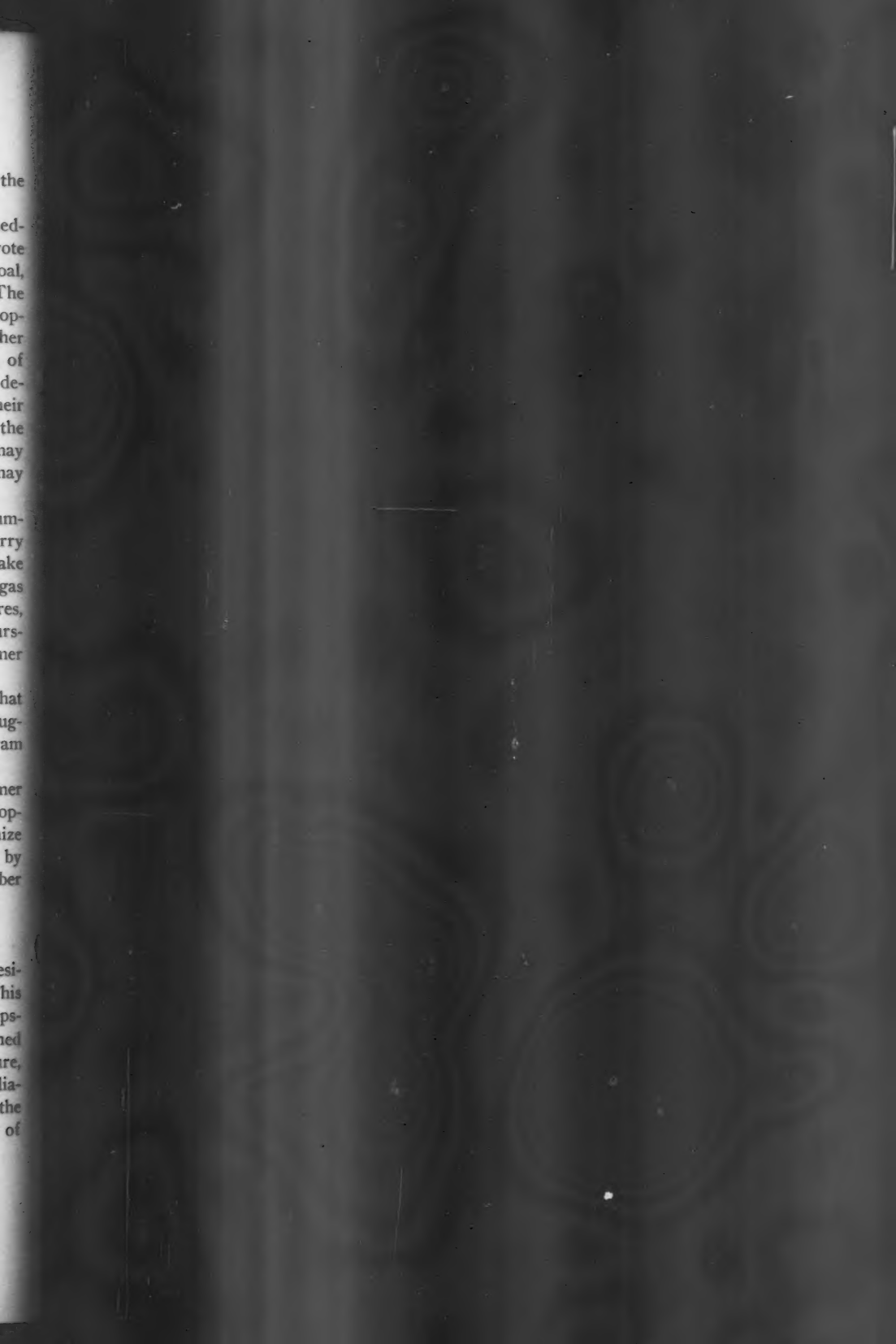
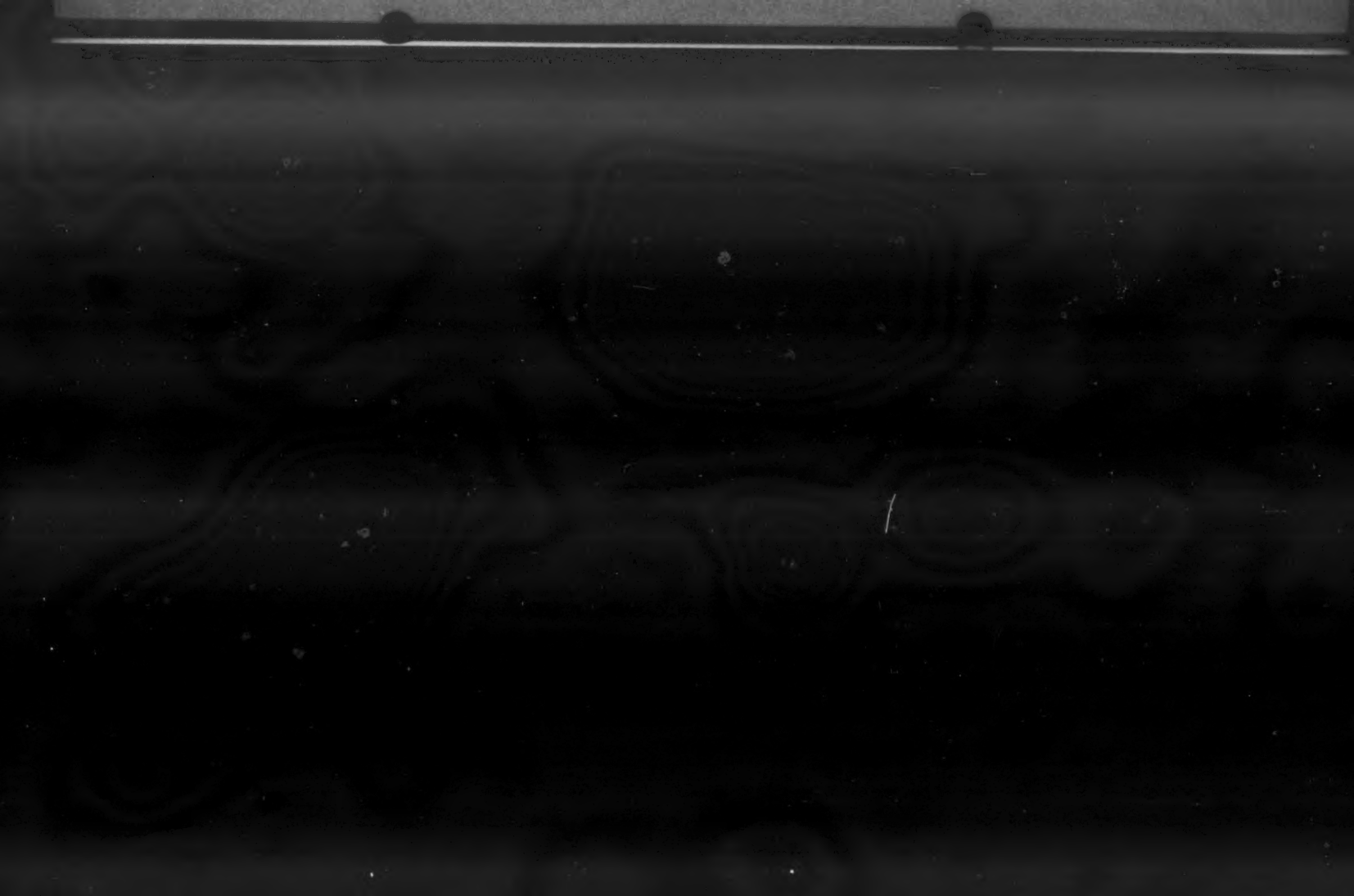
travel through the long length of pipe and the flow becomes sluggish, frequently choking the flue and connection and causing carbonization of the burners and coils and low heating efficiency. The location of the heater in relation to the flue being determined, the next point to be considered is to place it as close as possible to the fixture from which hot water will most frequently be drawn. In a residence, this is usually the kitchen. This is done to reduce the length of time elapsing from the time the faucet is opened until the hot water reaches the fixture, and also to reduce the heat loss by radiation which is in direct proportion to the length of the pipe and the number of times the water is drawn.





Employment Bureau

Today there is a pronounced and growing demand for high grade sales executives who can not only profitably merchandise the gas company's product, but who are also capable of handling the public relations of the company.

With the increasing tendency to actively push the merchandising of gas appliances so evident throughout the industry, there is springing up a greater demand for broad gauged and experienced men to fill important positions in gas companies.

The Association will act as a clearing house, and, without charge to its members, assist companies in getting in touch with individuals who are seeking new connections.

All inquiries from companies or applications from individuals should be directed to Association headquarters and will be treated as strictly confidential.

SERVICES REQUIRED

WANTED—Fitter who can do good work on installation of water heaters, ranges and who thoroughly understands Gas Company appliance work. Address A. G. A.
Key No. 61.

HIGH GRADE Industrial Sales Engineer wanted. Must be man having had factory experience and knowledge of house heating. Gas company in middle west has need of such a man and requests applicants to give full particulars of experience. Appointment for interview will be arranged. Address American Gas Association.
Key No. 0-3.

SERVICES OFFERED

WANTED—Position as executive in a local office of a gas or a combination gas and electric company. Have had a practical experience in all branches of commercial utility work. Have been successful in dealing with the public and promoting good will of utility companies. Educated in commercial and accounting methods as compiled by N. C. G. A. and N. E. L. A. Well acquainted in office routine and very exact on details and execution of same. Address A. G. A.
Key No. 114.

GAS APPLIANCE SALESMAN—Especially trained in water and house heating; 15 years' experience; desires selling position, either road or local, with aggressive appliance manufacturer or gas company. Will furnish best selling reference. Drawing account against commission. Address A. G. A.
Key No. 123.

WANTED—A young man with some experience in the manufacture and distribution of gas, as an Industrial Fuel Engineer in Sales Department of an eastern gas company. One who is qualified to work up various industrial fuel problems and make good in this end of the business is assured of proper advancement. Address A. G. A.
Key No. 01.

WANTED—Position by a man of large general experience in gas business who has made a special study of sales promotion problems, and who would prove valuable as an assistant to a busy executive in any department. Address A. G. A.
Key No. 134.

ENGINEER—Producing results in operation desires to make change, either as Engineer or Assistant Engineer of Works with output over 20,000,000 daily output. Or in Managing capacity. Address A. G. A.
Key No. 135.

AS MANAGER OR SUPERINTENDENT—9 years old, 15 years experience as Superintendent, 3 years in By-Product Coke Plants. Familiar with Commercial and Accounting work. Present Supervising several small plants. References. Address Key No. 136.

GAS PLANT PROPRIETORS—Is your gas plant run down? Is it paying dividends? Let me reorganize it and put it on a paying basis for you. To take personal charge. Address A. G. A.
Key No. 138.

INDUSTRIAL FUEL ENGINEER—Knowing heat treatment as applied to general industrial problems, house heating, hot water storage, and who knows the construction, operation and proper installation of every appliance he handles. Who has sold himself "Gas" as The heat treating medium, who has excellent "business getting" and executive abilities, would like to change to corporation where his abilities can be better utilized. Address A. G. A.
Key No. 139.

POSITION WANTED—Technical graduate with some experience in all branches of combination, manufactured, and natural gas companies, but particularly as head of industrial and new business departments, desires responsible position with a future. Address A. G. A.
Key No. 140.

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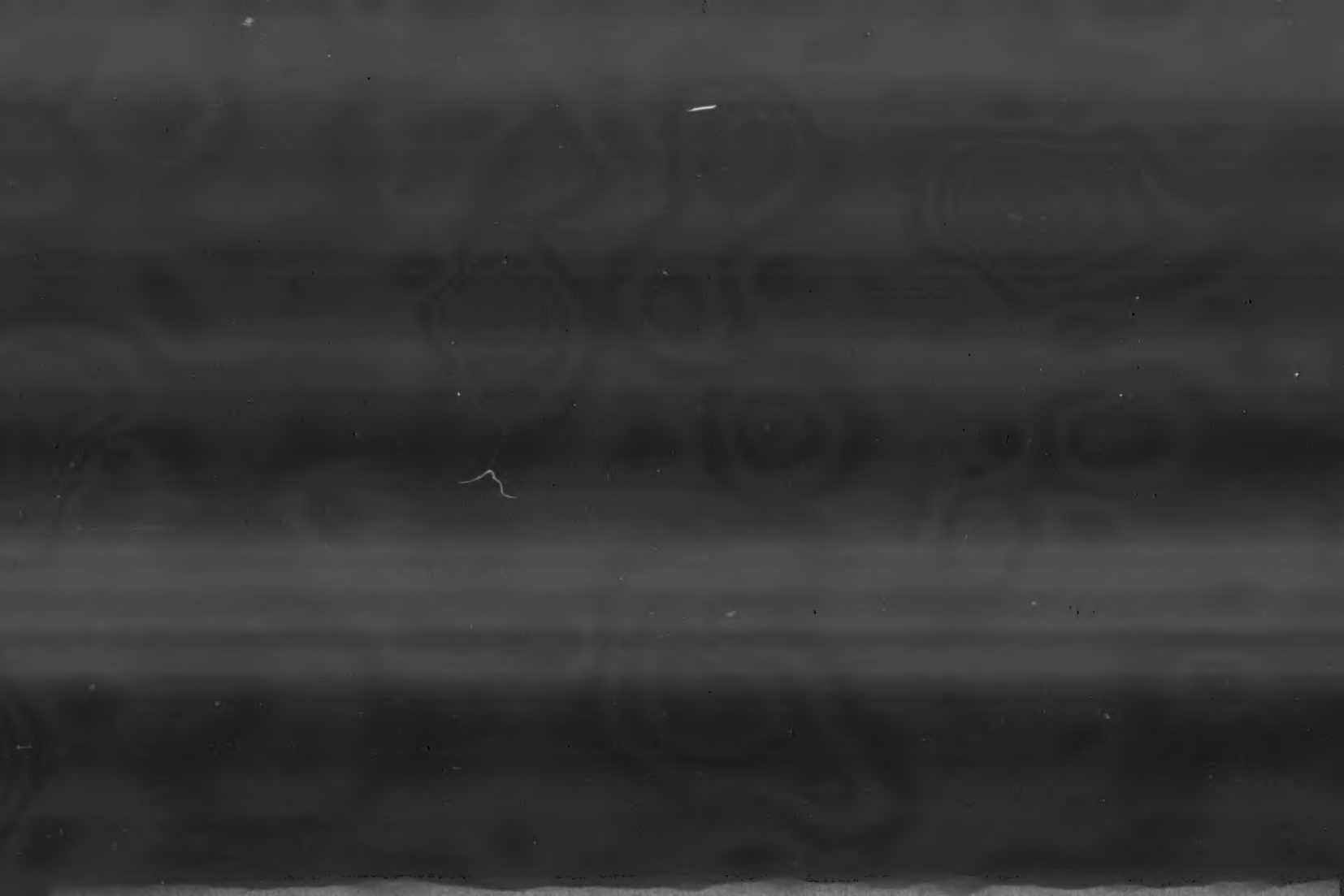
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